UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
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CHICAGO, IL 60604-3590

SENT VIA FEDEX

November 4, 2011

Mr. Stephen Quigley, P.E.
Principal-in-Charge/Project Manager
Conestoga-Rovers & Associates Ltd.
651 Colby Drive
Waterloo, Ontario
Canada N2V 1C2

RE: EPA Modified Vapor Intrusion Study Work Plan
South Dayton Dump and Landfill Site, Moraine, Ohio

Dear Mr. Quigley:

This letter is to notify you the U.S. Environmental Protection Agency (EPA) has modified Conestoga Rovers & Associates (CRA's) Vapor Intrusion Study Work Plan (VI Work Plan) for the South Dayton Dump and Landfill Site (Site). An electronic copy of the EPA-approved, modified VI Work Plan is attached.

EPA's modifications to CRA's VI Work Plan were made consistent with Paragraph 42 of the Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility, Docket VW-06-C-852 (ASAOC), which states:

> *After review of any plan, report, or other item that is required to be submitted for approval pursuant to this Settlement Agreement, including the SOW, U.S. EPA shall: (a) approve, in whole or in part, the submission; (b) approve the submission upon specified conditions; (c) modify the submission to cure the deficiencies; (d) disapprove, in whole or in part, the submission, directing that Respondents modify the submission; or (e) any combination of the above. However, U.S. EPA shall not modify a submission without first providing Respondents at least one notice of deficiency and an opportunity to cure within 21 days, except where to do so would cause serious disruption to the Work or where previous submission(s) have been disapproved to material defects.*

Respondents have, to date, submitted three versions of the required VI Work Plan report dated December 17, 2010, July 7, 2011 and August 5, 2011, respectively. EPA has provided the Respondents two opportunities to correct deficiencies in the

Respondents' VI Work Plan and submit a plan that is acceptable to the Agency. Notwithstanding comments provided via email and teleconference, and formal comments EPA provided to the Respondents on the first two submittals in letters dated March 17, 2011, May 11, 2011 and July 19, 2011, EPA could not approve the third document without additional changes.

Consistent with Paragraph 43 of the ASAOC, the Respondents shall proceed to undertake the sampling required by the modified VI Work Plan. As required by Paragraph 37(d) of the ASAOC, the Respondents shall confirm their willingness to perform the sampling in the modified VI Work Plan in writing within 7 days of your receipt of this request. In your notification, please also confirm that you will start the field work for the sampling no later than the first week of December, 2011. This will allow the initial subslab sampling and any follow-up, concurrent indoor air and subslab sampling, if required, to be completed within the winter months.

EPA also requests the Respondents consider collecting indoor air samples at the time of the initial round of subslab sampling. The number and locations of the indoor air samples (if required) are shown on the VI Work Plan figures. Depending on the sample results, it is possible that collecting the indoor air samples during the initial subslab sampling could outweigh the costs of having to remobilize to collect the indoor air samples, as well as the laboratory costs for the follow-up round of subslab samples that must be collected concurrently with the indoor air samples. If the Respondents decide to collect the indoor air samples at the same time as the initial subslab sampling, then the sampling should be initiated as soon as possible after December 22, 2011, so that the winter season is characterized (e.g., in January, 2012).

As with the Operable Unit 1 Remedial Investigation/Feasibility Study Report, EPA is not interested in pursuing stipulated penalties from the Respondents over this matter. EPA's only interest is in having a final, approved VI Work Plan, so the Respondents and EPA can move forward with the VI Study at the Site.

If you would like to set up a conference call to discuss the modified VI Work Plan or this matter further, please feel free to contact me at 312-886-1843 or at cibulskis.karen@epa.gov. Legal questions may be directed to Mr. Thomas Nash, Assistant Regional Counsel, at 312-886-0522 or at nash.thomas@epa.gov.

Sincerely,

Karen Cibulskis

Karen Cibulskis
Remedial Project Manager

Cc: T. Prendiville, SR-6J (letter only)
T. Nash, C-14J (letter only)
L. Marshall, OEPA
K. Brown, ITW

Vapor Intrusion Investigation Work Plan

South Dayton Dump and Landfill Site

Moraine, Ohio

As Modified by USEPA

Revision of the Conestoga-Rovers & Associates

August 9, 2011 Submittal

November 2011

Technical assistance provided by CH2M HILL

DISCLAIMER

This work plan is a modified version of the (unapproved) August 9, 2011 Vapor Intrusion Study Work Plan submitted to the USEPA by Conestoga-Rovers & Associates (CRA) on behalf of the Respondents to the Administrative Settlement Agreement and Order on Consent for the South Dayton Dump and Landfill Site.

CH2M HILL recommended modifications to the work plan to address comments provided to CRA and the Respondents by USEPA and Ohio EPA on March 17, May 11, and July 19, 2011. CH2M HILL also recommended modifications to address follow-up comments provided by USEPA and Ohio EPA during multiple teleconferences in September and October 2011. Upon acceptance of the recommended modifications by USEPA and Ohio EPA, CH2M HILL prepared this Work Plan. The revisions include modifications or additions to the sampling and data assessment procedures that are consistent with the October 2010 USEPA Region 5 Vapor Intrusion Guidebook (Guidebook) and input from the Ohio Department of Health.

- Historical analytical data were not added or modified.
- Historical analytical data were not validated, evaluated for data usability, assessed for appropriateness of collection methodology, or verified against their respective laboratory analytical reports.
- Screening levels presented in tables and figures were revised to be consistent with the Guidebook. Tables were added in order to compare the 2009 and 2010 soil vapor data to the correct screening levels.
- The revised Work Plan retains as much original figure content as possible. Changes in colors or line formatting are due to software compatibility issues. Minor formatting changes were made.
- Unrevised draft text was not edited.

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1 INTRODUCTION

This Vapor Intrusion Investigation Work Plan (Work Plan) presents the approach for a Vapor Intrusion Study (VI Study) to investigate sub-slab soil vapor conditions beneath buildings on and adjacent to the South Dayton Dump and Landfill Site consistent with the December 10, 2010, Dispute Resolution Agreement. The VI Study will be completed as an interim response action pursuant to Paragraph 37(c) of the Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study (RI/FS) of the Site, Docket No. V-W-06-C-852 (ASAOC). The VI Study is required under Paragraph 4 of the December 10, 2010, Dispute Resolution Agreement signed by the Respondents and United States Environmental Protection Agency (USEPA).

Conestoga-Rovers & Associates (CRA) prepared a draft of this Work Plan on behalf of the Respondents to the ASAOC (Respondents) and submitted it to USEPA for approval on August 9, 2011. In September 2011, USEPA tasked its oversight contractor, CH2M HILL, to assist USEPA in addressing outstanding USEPA and Ohio EPA comments on CRA's August 9, 2011, Work Plan. The November 2011 Work Plan is the USEPA-modified CRA Work Plan, with assistance from CH2M HILL, completed under Work Assignment 130-RSBD-B52B, Statement of Work Revision 2.

The Respondents to the ASAOC include Hobart Corporation (Hobart), Kelsey Hayes Company (Kelsey-Hayes), and NCR Corporation (NCR). These three Respondents (the PRP Group) are and have been performing the Work required by the ASAOC under the direction and oversight of the USEPA.

USEPA will complete community outreach for the on-Site businesses and adjacent businesses and residents. Additional involvement by the Respondents may be required if the scope of the vapor intrusion study is expanded.

1.1 BACKGOUND INFORMATION

The Site is located at 1901 through 2153 Dryden Road and 2225 East River Road in Moraine, Ohio (Figure 3). The Site is bounded to the north and west by the Miami Conservancy District floodway (part of which is included in the definition of the Site), the Great Miami River Recreational Trail and the Great Miami River beyond. The Site is bounded to the east by Dryden Road with light industrial facilities beyond, to the southeast by residential and commercial properties along East River Road with a residential trailer park beyond, and to the south by undeveloped land with industrial facilities beyond.

The Site operated as a landfill from the early 1940s until 1996. Municipal, commercial, and industrial wastes were disposed at the landfill over the years. Combustible wastes often were burned. Site environmental assessments began in 1985 and are ongoing. Detailed information on the Site history and environmental assessment is contained in the *Streamlined Remedial Investigation and Feasibility Study for Operable Unit One* (OU1 RI/FS, CRA, June 2011), which is under review by USEPA.

In accordance with USEPA's (2005) *Guidance for Evaluating Landfill Gas Emissions from Closed or Abandoned Facilities*, landfill gas (LFG) is the natural byproduct of the anaerobic decomposition of biodegradable waste in landfills. It typically consists of 40 to 60 percent carbon dioxide, 45 to 60 percent methane, and trace constituents that include volatile organic compounds (VOCs) and hazardous air pollutants. More than 50 different VOCs (including simple alkanes, olefins, aromatics, and a wide array of chlorinated compounds) have been identified in LFG. In addition, non-organic species such as hydrogen sulfide and vapor-phase mercury often are found in LFG. LFG from co-disposal facilities typically includes higher VOC concentrations compared to a municipal solid waste landfill that has not received any significant quantity of toxic or hazardous waste.

Subsurface lateral migration of LFG must be considered during environmental assessments. Lateral migration may be especially problematic when surface soil is frozen or surrounding areas are paved. These situations result in a higher subsurface pressure gradient and, thus, longer transport distances.

As discussed in USEPA (2005), VI of LFG into nearby existing or reasonably anticipated future buildings is a potential exposure pathway that needs to be assessed. VI is the migration of volatile chemicals from the subsurface into overlying buildings. VI is a potential concern at any building, existing or planned, located near soil, groundwater, or soil vapor contaminated with toxic chemicals that may volatilize or chemicals that are combustible. Figure 1 presents a conceptual site model (CSM) illustrating VI.

Methane is a flammable, potentially explosive gas that is combustible under specific conditions (i.e., the right combination of methane and oxygen plus a source of ignition). Methane is explosive at concentrations that range from the lower explosive limit (LEL) of 5 percent to the upper explosive limit (UEL) of 15 percent methane per volume of air. This corresponds to methane concentrations of 50,000 to 150,000 parts per million by volume (ppmv). A percentage of the LEL (e.g., 10 percent [5,000 ppmv]) is commonly used as a trigger/action level to provide some margin of safety. However, the VI pathway cannot be dismissed if vapor concentrations are below the LEL (or action level) for methane because vapor concentrations of other VOCs or toxic LFG constituents may still be unacceptable (USEPA 2005).

During the streamlined RI for Operable Unit 1, elevated concentrations of VOCs (including naphthalene) in groundwater and landfill materials were observed at the Site. These observations, along with the presence of on-Site and nearby buildings and concerns about potential methane generation and migration, triggered concerns about soil vapor.

In September 2009, soil vapor samples were collected from 21 permanently installed soil vapor probes at the Site and on an adjacent property, and one of the soil vapor probes was re-sampled in January 2010 (GP20-09 on Parcel 5171). The samples were analyzed for VOCs by USEPA Method TO-15. The soil vapor sample results were screened with generic soil vapor screening levels (SVSLs) that were derived by applying the USEPA Region 5 Vapor Intrusion Guidance (USEPA 2010) default soil-gas-to-indoor-air attenuation factor of 0.1 to the USEPA (2011) indoor air regional screening levels (RSLs). The RSLs are derived assuming a 10^{-6} target ELCR level or a HI of 1. Evaluation surrogates were used for constituents without RSLs. Industrial SVSLs were used for commercial and industrial buildings; residential SVSLs were used for residential buildings.

Table 2 presents the September 2009 and January 2010 soil vapor sample results compared to the industrial SVSLs. Table 3 presents the September 2009 soil vapor sample results from the soil vapor probes that are located in the vicinity of residential buildings (GP06-09, GP07-09, GP08-09, and GP09-09) compared to the residential SVSLs. Figure 3 presents the soil vapor results that were greater than the SVSLs. The VOCs detected in soil vapor samples in exceedance of the SVSLs were 1,1-dichloroethane (DCA); benzene; chlorobenzene; chloroform; cis-1,2-dichloroethane; ethylbenzene; naphthalene; tetrachloroethene; trichloroethene; vinyl chloride, and total xylenes. Exceedances of the SVSLs occurred at 16 of the 21 soil vapor probes.

Field screening for methane was performed at the soil vapor probes in September, October, and December 2009 (Figure 3). The soil vapor methane concentrations were compared to the UEL (15 percent methane) and LEL (5 percent methane) for methane (Table 4). Methane concentrations exceeded 10 percent of the LEL (0.5 percent methane) at 10 of the 21 soil vapor probe locations, the LEL at 5 of those 10 locations, and the UEL at 3 of those 5 locations.

1.2 DISPUTE RESOLUTION AGREEMENT

There are a number of buildings located on the Site and adjacent properties, above or immediately adjacent to fill material and in close proximity to the soil gas probe locations where elevated concentrations of VOCs and methane were detected. By a letter dated October 5, 2010, USEPA had directed Respondents to submit a work plan for a VI Study to address the potential for current risks from VI to residents and businesses in buildings on and adjacent to the Site.

Under the December 10, 2010 Dispute Resolution Agreement the Respondents and USEPA agreed that the Respondents will complete the VI Study to assess the potential for methane, VOCs, and naphthalene in soil vapor to result in potential risks to receptors in buildings on and adjacent to the Site.

Specifically, Paragraph 4 of the Dispute Resolution Agreement states:

> *[T]he Respondents shall conduct the VI Study, as required by EPA, pursuant to Paragraph 37(c) of the ASAOC, as an interim response action. EPA has given the Group a copy of the newly issued EPA Region 5 Vapor Intrusion Guidebook (Guidebook) and the Parties have agreed that the Respondents will prepare their VI Work Plan, which will include Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP) Addenda, in accordance with this new guidance and other relevant guidance (e.g., FSP and QAPP guidance). The Parties agree that the Work Plan will provide for sub-slab sampling, on an expedited schedule of any of the following structures which are of slab-on-grade construction or have basements or enclosed crawl spaces (see highlighted structures on Figure [1], attached, for an illustration of the structures for which sub-slab sampling is anticipated):*
>
> *A. Structures On Site West of Dryden Road:*
> *3 building structures on Lot 5054*
> *3 building structures on Lot 5171*
> *2 building structures on Lot 5172*
> *1 building structure on Lot 5174*
> *1 building structure on Lot 5175, and*
>
> *B. Structures On Site or Adjacent to Site Along East River Road:*
> *4 building structures on Lot 4610 (Barnett; on-Site)*
> *2 building structures on Lot 3207*
> *1 residence on Lot 3253; and*
> *1 building structure on Lot 3254.*
>
> *Any additional structures on the Site that are, or may be, occupied will be evaluated to determine the need for VI sampling.*
>
> *The Parties agree that if any structure on or adjacent to the Site that is or may be occupied has no slab (e.g., dirt or gravel floor) that Respondents will take indoor air samples (see Section 6.6 of Guidebook).*
>
> *The Parties agree that the Respondents shall submit a Work Plan for the VI Study required by EPA by December 17, 2010. The Parties agree that if identified contaminant concentrations pose more than a 1 × 10-4 cancer risk or a hazard index greater than 1.0 through the VI pathway to*

> *current or potential future receptors, or if VI sampling results show an exceedance of 10% of the Lower Explosive Limit [for methane], EPA may require actions to mitigate those risks.*

The PRP Group prepared initial drafts of this Work Plan based on requirements of the Dispute Resolution Agreement, previous investigation results, discussions between the PRP Group and USEPA, and the results of the survey of buildings at the parcels identified in the Dispute Resolution Agreement. The building surveys were completed by representatives of CH2M HILL (USEPA's oversight contractor), Ohio Environmental Protection Agency (Ohio EPA), the Respondents, and CRA (refer to Section 2 for additional details).

In September, 2011, USEPA tasked its oversight contractor, CH2M HILL, to assist USEPA in addressing outstanding USEPA and Ohio EPA comments on CRA's draft August 9, 2011, Work Plan. This final, approved Work Plan is the USEPA-modified CRA Work Plan, with assistance from CH2M HILL.

1.3 PURPOSE AND SCOPE

The purpose of the VI Study is to collect additional data to determine if compounds are currently present in soil vapor beneath on-Site and nearby building foundations and floor slabs at concentrations sufficient to create the potential for contaminants to migrate into the indoor air of the VI Study buildings at levels posing an unacceptable risk to building occupants. If sub-slab soil vapor (or crawl space air) VOC concentrations exceed the SVSLs (or CSSLs) for further investigation (See Section 5 and Tables 5 and 6), then follow-up indoor air sampling with concurrent sub-slab soil vapor (or crawl space air) and outdoor air sampling will be performed to determine if the VI pathway is causing indoor air VOC concentrations to exceed the IASLs for mitigation (See Section 5 and Table 7). Alternately, indoor air sampling (with outdoor air sampling) may be conducted concurrently with the Round 1 sub-slab soil vapor (or crawl space air) sampling at any or all of the VI Study buildings to minimize the number of field mobilizations and number of subslab samples that may ultimately be required.

Ongoing monitoring may be required during and after the Remedial Design / Remedial Action (RD/RA) to ensure that risks to receptors associated with soil vapor migration to indoor air do not exceed target levels in the future. Additionally, permanent explosive gas alarms will be installed in all occupied structures located within 200 ft of the horizontal limits of waste placement as required by Ohio Administrative Code (OAC) 3745-27-12. The ongoing monitoring for the RD/RA and installation of permanent explosive gas alarms are not covered by this work plan.

The VI Study consists of the following to assess the potential VI risk to relevant receptors:

- A building survey to identify the buildings present on the parcels listed in Section 1 and to develop a CSM for each of the buildings[1]. The CSMs were used to determine the number and types of samples required to characterize the potential VI risk to relevant receptors.
- Sub-slab soil vapor probes installed and sampled at each of the VI Study buildings that have slabs. The sub-slab samples will be field screened for methane and carbon dioxide (the main components of LFG) at each of the buildings. Sub-slab soil vapor samples also will be analyzed for VOCs at buildings designed for occupancy (i.e., residences and buildings associated with commercial or industrial businesses where workers would be expected to access the building frequently and for extended periods). Sub-slab soil vapor samples at buildings that are currently vacant or unused but with the potential to become occupied in the future will be analyzed for VOCs.
- Indoor air methane and carbon dioxide concentrations will be measured at each of the VI Study buildings using field instruments.
- Crawl space air samples will be collected instead of sub-slab soil vapor samples at the two buildings with crawl spaces (Building A on Parcel 4610 and Building MP on Parcel 5054). The crawl space air samples will be field screened for methane and carbon dioxide and analyzed for VOCs. Concurrent outdoor air samples will be collected at each parcel near these buildings to assess ambient VOC contributions at the Site to the crawlspace air samples.
- Concurrent sub-slab soil vapor, indoor, and outdoor air samples will be collected at Building 1 on Parcel 3253 because this building has a basement with foundation walls that are in poor condition (i.e., where VI could occur through the walls). An outdoor air sample also will be collected at this parcel with the indoor air samples to assess ambient VOC concentrations adjacent to the building.
- One outdoor air sample will be collected for VOC analysis each day that sub-slab soil vapor samples are collected for VOC analysis. The outdoor air samples collected at the parcels where indoor or crawl space air sampling is being performed will serve as the daily outdoor air sample. To ensure local-scale outdoor air concentrations are characterized at and adjacent to the building, multiple outdoor air samples will be collected if parcels more than 1,000 feet apart are sampled in a single day. Outdoor air methane and carbon dioxide

[1] The building surveys were completed between June 21 and 22, 2011, by representatives of CH2M HILL, Ohio EPA, the Respondents, and CRA.

concentrations will be measured each day at each of the VI Study parcels being sampled.

- Concurrent sub-slab soil vapor, indoor, and outdoor air samples will be collected during a follow-up sampling event at each of the VI Study buildings where the measured Round 1 sub-slab soil vapor (or crawl space air) VOC concentrations exceed the SVSLs (or CSSLs) for further investigation (See Section 5 and Tables 5 and 6). Alternately, indoor air sampling (with outdoor air sampling) may be conducted concurrently with the Round 1 sub-slab soil vapor (or crawl space air) sampling at any or all of the VI Study buildings to minimize the number of field mobilizations and number of subslab samples that may ultimately be required.
- Conduct multiple rounds of VI sampling at each of the VI study building unless mitigation is performed after the Round 1 sampling event. The Round 1 sampling event will be performed in the winter. If follow-up sampling is triggered by the Round 1 results, then the sampling event will also be performed in the winter. The Round 2 sampling event (i.e., resampling of all the Round 1 and Round 1 follow-up sampling locations) will be performed in the mid-summer. If follow-up sampling is triggered by the Round 2 results, then the sampling event will also be performed in the summer.
- Analytical results will be compared with the applicable residential or industrial screening levels (Tables 2 through 6) in accordance with the data evaluation procedures described in Section 5 and the flow chart provided on Figure 2. Additional non-analytical lines of evidence (e.g., building characteristics) also will be considered during the data evaluation.
- If it is determined that mitigation or monitoring is required at any of the VI Study buildings, then separate work plans will be submitted to USEPA for approval as discussed in Section 5.

1.4 VAPOR INTRUSION GUIDANCE

The VI Study will be performed in accordance with the following vapor intrusion guidance documents:

- Office of Solid Waste and Emergency Response (OSWER) - Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance), November 2002 (USEPA, 2002)
- Interstate Technology Regulatory Council (ITRC) - Vapor Intrusion Pathway: A Practical Guide, January 2007 (ITRC, 2007)

- United States Environmental Protection Agency (USEPA) – Region 5 – Vapor Intrusion Guidebook, October 2010 (USEPA, 2010)
- Ohio Environmental Protection Agency (Ohio EPA) – Sample Collection and Evaluation of Vapor Intrusion to Indoor Air Guidance Document, May 2010 (Ohio EPA, 2010).

1.5 WORK PLAN ORGANIZATION

The remainder of this Work Plan is presented in the following titled sections:

- Section 2, Conceptual Site Models for VI Study Buildings
- Section 3, Data Quality Objectives
- Section 4, Proposed Sampling Activities
- Section 5, Data Evaluation and Reporting
- Section 6, Schedule
- Section 7, References

2 CONCEPTUAL SITE MODELS FOR VI STUDY BUILDINGS

On June 21 and 22, 2011, representatives of CH2M Hill, Ohio EPA, the Respondents, and CRA completed building surveys at the parcels identified in the Dispute Resolution Agreement (see Section 1.1), which included a visual inspection of the parcels and the buildings located thereon. Twenty-seven buildings were identified on the parcels. The one building on Parcel 5176 was excluded from the VI Study because it is a trailer that is not skirted (i.e., outdoor air flows freely beneath the building); therefore, a potential for VI does not exist. A building survey was not performed at this building. There were two buildings that were not accessible during the building surveys; Building 7 on Parcel 5054, and Building 3 on Parcel 5172. Additionally, half of Building 1 on Parcel 5172 was not accessible; however, a portion of the building was visible through the front windows. A twenty-eighth building was identified on Parcel 5171 (Building 4) during a site visit in September 2011. Building surveys for these three and one-half buildings will be completed during the first 3 days of the Round 1 sampling event and will be coordinated with USEPA's onsite representative. The sampling locations at these buildings will be selected during the building survey in conjunction with USEPA's onsite representative and will be approved by USEPA (figures showing the sampling locations will be submitted via e-mail to USEPA within 3 days of the building survey). The sampling will then be performed at these buildings during the Round 1 sampling event after USEPA approval of the sampling locations is confirmed. The CSMs for these buildings will be included with the data evaluation submitted after the initial Round 1 sampling event.

The building surveys were completed in order to gather the information necessary to develop VI-specific CSMs for each VI Study building; the CSMs then were used to develop the VI Study sampling plans for each of the VI Study buildings (see Section 4). CRA documented the number and type of buildings present on each Parcel in order to ensure that all buildings are included in the sampling program. At 25 of the 28 VI Study buildings, CRA documented information pertinent to the development of VI-specific CSMs on a Building Physical Survey Questionnaire (e.g., the purpose of each building, hours of occupation, type of building foundation, and nature of the ground surface surrounding the buildings). Ohio EPA and CH2M Hill provided additional details based on their observations. The original Building Physical Survey Questionnaires, including comments from Ohio EPA and CH2M Hill, and associated building photographs, are provided in Appendix A (provided electronically). The VI Study building locations are shown on Figure 4.

CRA used the information obtained during the building surveys to develop VI-specific CSMs for each VI Study building. The CSMs present information about the buildings that is pertinent to the VI pathway such as use and design, floor slab condition, and VOC, naphthalene and methane concentrations measured at nearby investigative installations. Figure 5 presents soil, groundwater, and soil gas investigative locations in the vicinity of the VI Study buildings. The CSMs are summarized in Table 1 and on Figures 6 through 31. The respective figures for each building show the maximum detected concentration of selected compounds in nearby soil gas, landfill material, and groundwater locations sampled between 2008 and 2011. As discussed during the July 26, 2011, conference call between the Respondents, USEPA, Ohio EPA, and CH2M Hill, the selected compounds include 1,1,1-trichloroethane, 1,1-dichloroethane, cis-1,2-dichloroethene, trans-1,2-dichlorothene, benzene, chlorobenzene, chloroform, ethylbenzene, methylene chloride, naphthalene, tetrachloroethene (PCE), trichloroethene (TCE), toluene, vinyl chloride, and xylenes. A description of each building is provided below.

2.1 PARCEL 3207 - GLOBE EQUIPMENT

2.1.1 PARCEL 3207 - GLOBE EQUIPMENT BUILDING 1

The building is a single-story, commercial/industrial-use building comprised primarily of office space with some assembly/warehouse space (Figure 6). The building was constructed in 2004 over the historic location of former gasoline retail station and automobile salvage yard. The building footprint is 9,954 square feet (ft^2). The building has a concrete on-grade slab; unsealed joints can be seen in assembly/warehouse space. The office space has wall-to-wall carpeting. The building is insulated and relatively air tight with sealed, inoperable windows. The building is heated by forced air natural gas units located on the roof. Central air conditioning (A/C) is also provided by rooftop units. Exterior openings include vents, utility pipe penetrations, man doors, and a roll-up door in the warehouse. The building is occupied weekdays from 8 a.m. to 5 p.m. by approximately 15 adult workers.

2.1.2 PARCEL 3207 - GLOBE EQUIPMENT BUILDING 2

The building is a single-story industrial-use building comprised primarily of warehouse/ assembly space with some office space (Figure 7). Before 1968, the main portion of the building was constructed of concrete block. The northern addition was constructed before 1973 of steel frame and aluminum siding. The building footprint is 19,803 ft^2, and the ceilings are 16 feet high with 8-foot drop ceilings in the office space. The building has a concrete on-grade slab with unsealed joints. The majority of the building has bare concrete floors, except the office space is carpeted. Some large floor cracks are visible, with some cracks sealed. The building is not insulated, and is relatively air tight with unsealed windows and bay doors that are open in good weather. The building is centrally heated by forced air natural gas furnace. Central A/C is also provided by rooftop units. Exterior openings include vents, fans, utility pipe penetrations, windows, bay doors, and personnel doors. The building is occupied weekdays from 7:00 a.m. to 5:00 p.m. by approximately 25 adult workers.

2.2 PARCEL 3253

2.2.1 PARCEL 3253 - HOUSE, BUILDING 1

The building is a two-story, residential, single-family house constructed in the 1800s (Figure 8). The building has a stone foundation and vinyl siding. The basement of the house is 926 ft^2 and is damp and unfinished, with a concrete floor that contains an approximately 2-foot-diameter hole. The effluent of a condensate pipe is located over the large hole in the basement concrete floor. The building is constructed of stone and mortar foundation walls (unsealed), which are in poor condition. The building is relatively air tight with sealed windows. The building is centrally heated by a forced air natural gas furnace, and fireplace, and cooled by central A/C. Exterior openings include utility pipe penetrations, two windows, and two man doors (one exterior and one to the house).The building is constantly occupied by one adult resident. The basement does not appear to be used for storage and CRA did not observe any potential background sources of indoor air contaminants within the basement.

2.2.2 PARCEL 3253 - GARAGE, BUILDING 2

The building is a single-story, two-car garage constructed in the early 1990s (Figure 9). The building footprint is 1,128 ft^2. The building has a concrete on-grade slab with 4-inch high, poured concrete foundation walls (unsealed), and vinyl -siding. The concrete slab is composed of six separate poured sections with unsealed joints. The building is relatively air tight with sealed windows. No heating, ventilation, and air conditioning (HVAC) systems are present in the building. Exterior openings include two windows, overhead and personnel doors. The building is used for storage only and has no regular occupancy.

2.3 PARCEL 3254 - MIDDLETON TRUCKING BUILDING 1

The building is a single-story, commercial-use building comprised primarily of a heavy truck repair garage with a small office and a bathroom (Figure 10). The building was constructed before 1968. The building footprint is 2,000 ft^2, and the ceiling (an exposed sheet metal roof) is 12 feet high. The concrete block walls are unsealed and cracked in areas. The building has a concrete on-grade slab. The majority of the concrete shop floor contains large cracks and is heavily stained. CRA observed the heaviest staining at the rear of the building, adjacent to aboveground storage tank (AST) and compressor. The building is not insulated, with no air tightness, and unsealed windows. Overhead natural gas heaters and a wood stove with an exterior air vent located through the west wall heat the building. Exterior openings include vents, fans, utility pipe penetrations, six windows, a man door, and a large overhead door. The overhead door is open during business hours. The building is occupied weekdays from 8:00 a.m. to 5:00 p.m. by three to four adult workers. The parts washer in the building may have used chlorinated solvents historically but now only uses mineral spirits.

2.4 PARCEL 4610

2.4.1 PARCEL 4610 - ARA TRUCKING BUILDING 1

The building is a single-story, commercial-use trailer constructed early 1990s (Figure 11). It is designed as a residential trailer; there are two bedrooms, a bathroom, a kitchen, and a living room. The living room is being used as an office; the two bedrooms are unused. The trailer is 685 ft^2 placed over a concrete pad with a crawl space enclosed by wood skirting (poor condition). The concrete and wood appear damp. The trailer is insulated and relatively air tight, with sealed windows. The building is centrally heated by a forced air propane furnace. Central A/C is also provided. Exterior openings include vents, utility pipe penetrations, windows, doors. The building has variable occupancy that consists of several hours every few weeks by two adult workers.

2.4.2 PARCEL 4610 - RON BARNETT CONSTRUCTION BUILDING B

The building is a single-story, commercial-use storage building constructed before 1993 (Figure 12). The building is primarily warehouse space (one large open space with no partitions) that is used for storing estate sale items with a modular office that currently is not in use. There is an attached open garage with a dirt floor. The building footprint is 1,800 ft^2 (without the garage). It is a wood frame building with steel beams covered with steel cladding. The ceiling is 20 feet high. The building has a concreted on-grade slab with concrete block foundation walls (poor condition). The building floor is exposed concrete and contains large cracks. The building is not air tight. No central HVAC systems are present in the building. A window A/C unit is located in the modular office that draws air from the warehouse. Exterior openings include a large sliding door, and a personnel door. The building is occasionally occupied two to three times per month, by an adult worker picking up or dropping off storage items.

2.4.3 PARCEL 4610 - RON BARNETT CONSTRUCTION BUILDING C

The building is a single-story commercial-use storage building, constructed in the early 1990s (Figure 13). The building is primarily warehouse space (one large open space with no partitions) that is used for storage; a van, a trailer, and other miscellaneous items were observed during the building survey. There is a former bathroom in the northwestern corner that is no longer in use; the plumbing was shut off. There is an attached open lean-to with a dirt floor. The building footprint is 1,088 ft^2. The ceiling is 16 feet high. The concreted slab is on-grade with unsealed joints; there is no floor covering. Floor cracks are present. It is a wood frame building covered with steel cladding. The building is insulated and is not air tight. Floor cracks are present. No HVAC systems are present in the building. Exterior openings include a sliding door and a personnel door. The building is used for storage only and has no regular occupancy.

2.4.4 PARCEL 4610 - RON BARNETT CONSTRUCTION BUILDING D

The building is a single-story commercial-use storage building, with construction completed in the early 1990s (Figure 14). The building is entirely warehouse space with a plywood partition that is open at the top. The building is used for storage; a car, a lawn tractor, and other miscellaneous items were observed during the building survey. There is an attached open garage with a dirt floor. The building footprint is 1,200 ft^2. The building has a concrete on-grade slab with sealed joints; there is no floor covering. Floor cracks are present. It is a wood frame building covered with steel cladding. The building is not airtight. No HVAC systems are present in the building. Exterior openings include two sliding bay doors and personnel doors. The building is used for storage only and has no regular occupancy.

2.4.5 PARCEL 4610 - RON BARNETT CONSTRUCTION BUILDING E

The building is a single-story commercial-use building constructed by the early 1990s (Figure 15). The building is divided into three sections; the majority of the building is a car repair garage, there is a small storage area, and there is an office space with a bathroom. The building footprint is 1,200 ft^2. The ceiling is 20 feet high in the garage and storage area. The ceiling in the office is 8 feet high; the area above the office is used for storage (accessible from the storage area). The building has a 4-inch-thick concrete on-grade slab with unsealed joints; there is no floor covering. Significant floor cracks are present in the office and adjacent storage area. It is a wood and steel frame building covered with steel cladding. The building is not air tight, with a sealed window in the office and no weather seals in the storage area.

The office portion of the building is heated by electric baseboards and cooled by a window A/C unit. A wood stove is in the center of the building, which vents through the roof. Exterior openings include utility pipe penetrations, windows, sliding bay, overhead garage doors, and a personnel door. The overhead door is open when the garage is in use. The garage is occupied during variable hours (mostly occasional evenings and weekends) by two adult workers. The office may be occupied during normal working hours by one adult worker.

2.5 PARCEL 5054 - VALLEY ASPHALT

2.5.1 PARCEL 5054 - VALLEY ASPHALT BUILDING 1

The building is a single-story, commercial-use building, constructed before 1993 (Figure 16). The building footprint is 1,500 ft^2. It is an office building with six single offices, bathrooms, and a kitchenette. The drop ceiling is 8 feet high. It is a brick building with steel cladding. The building has a concrete on-grade slab; there is wall-to-wall carpeting in the majority of the building. The building is relatively air tight, with sealed windows that are inoperable. The building is centrally heated by a forced air natural gas furnace. Exterior openings include vents, utility pipe penetrations, windows (inoperable), and two personnel doors. The building has not been occupied for the past four or five years.

2.5.2 PARCEL 5054 - VALLEY ASPHALT PLANT BUILDING 2

The building is a commercial/industrial-use building constructed before 1959 (Figure 17). The building footprint is 4,888 ft^2. The concrete slab is on-grade with unsealed joints. The building is divided into two sections with a cracked cinder block wall between them. The building has not been occupied for more than 10 years. The northern side (approximately one quarter) of the building is a brick, single-story building. It was used formerly as office space with several separate offices. The office area is carpeted and has a strong moldy/musty odor. This section of the building is relatively air tight, with sealed windows. This portion of the building is centrally heated by a forced air natural gas furnace and is cooled by a ground unit A/C that is located outside the east wall. Exterior opening include utility pipe penetrations, windows, and two personnel doors (one to a Quonset hut).

The southern side (approximately three-quarters) of the building is a steel double-arch Quonset hut that is used as storage space. It has a bare concrete floor with cracks in areas. This section of the building is unsealed and is not airtight. There is no HVAC system in this section of the building. Exterior openings include vents, wall openings, fans, utility pipe penetrations, windows (several of which were broken during the June 2011 building survey but found to be repaired during a September 2011 site visit), and bay and personnel doors.

2.5.3 PARCEL 5054 - VALLEY ASPHALT PLANT BUILDING 3

The building is a single-story industrial-use building formerly used as a garage (Figure 18). The building footprint is 457 ft^2. It is a concrete block building with a gravel and earthen on-grade floor. The building is not insulated. The building is not air tight; a personnel door and overhead door panels are missing. A wood stove is present in the building but is no longer used. No other

HVAC systems are present in the building. Exterior openings include vents, wall openings, utility pipe penetrations, and windows. The building is vacant and has no regular occupancy.

2.5.4 PARCEL 5054 - VALLEY ASPHALT PLANT BUILDING 4

The building is an industrial-use building, constructed prior to 1993 (Figure 19). It is a pre-fabricated split-level building on top of a poured concrete basement that is half below grade. The building footprint is 280 ft^2. The basement is unfinished, and contains paint storage on shelves. The main level is used as the control tower for the asphalt plant; there is office space and a bathroom. Electric baseboards heat the building. Window A/C units are also present in the control room. Exterior openings from the basement include utility pipe penetrations and a personnel door that sometimes left open. The building is occupied weekdays during business hours by two adult workers.

2.5.5 PARCEL 5054 - VALLEY ASPHALT PLANT BUILDING 5

The building is a single-story, industrial-use building with steel cladding (Figure 20). The building was constructed before 1968 and originally was located near Valley Asphalt Building 1; it was moved to its present location before 1993. The building footprint is 594 ft^2. The building contains a testing laboratory and a small office. The ceiling is 8 feet high. The building has a concrete on-grade slab. The concrete flooring is coated or painted and contains some thin cracks. The building is relatively airtight with sealed windows. Exterior openings include vents, fans, windows (inoperable), and a personnel door. A forced air natural gas furnace centrally heats the building. Window A/C units are also present in the laboratory and office. One adult worker (office) occupies the building during weekday work hours, and approximately four adult workers rarely occupy the laboratory at various times.

2.5.6 PARCEL 5054 - VALLEY ASPHALT PLANT BUILDING 6

The building is a single-story, industrial-use storage building constructed before 2005 (Figure 21). The building footprint is 218 ft^2. It has a steel frame with steel cladding and an earthen on-grade floor. The building is not insulated, and is not air tight. No HVAC systems are present in the building. Exterior openings include vents and one personnel door. The building is used for chemical storage. The building is used for storage only and has no regular occupancy.

2.5.7 PARCEL 5054, BUILDING 7

The building is a single-story industrial-use garage and storage building constructed before 1968 (Figure 22). The building footprint is 822 ft^2. It is constructed of concrete block. The building owner is unknown, and CRA was not able to inspect the building interior at time of building surveys. The building is heated by a forced air natural gas wall mounted heater. Exterior openings include vents, utility pipe penetrations, and an apparently inoperable bay door with broken panels. The building appears to be used for storage only, and does not appear to have been occupied for an extended period of time.

2.5.8 PARCEL 5054, MURPHY'S PLUMBING BUILDING MP

The building is a single-story commercial-use building, constructed prior to the 1950s (Figure 23). During the building survey, the building was being used as office and storage space. The building footprint is 365 ft^2. It is on a raised foundation with wood siding. The building is not air tight, with unsealed windows. Exterior openings include windows and one personnel door. No HVAC systems are present in the building. The building is vacant as of July 1, 2011, with no occupancy.

2.6 PARCEL 5171 - B&G TRUCKING

2.6.1 PARCEL 5171 - B&G TRUCKING BUILDING 1

The building is a commercial-use building constructed prior to 1968(Figure 24). The building footprint is 13,700 ft^2. The building has a concrete on-grade slab with unsealed joints. Seven adult workers occupy the building weekdays from 7 a.m. to 5 p.m. The building is divided into two sections. The eastern side (approximately one quarter) is a brick two-story building. There are multiple offices, a reception area, and a paint storage room (northeastern corner). During the building survey, strong paint odors were observed in the paint storage room. There is wall-to-wall carpet in the offices. This section of the building is relatively airtight with sealed windows. A forced air natural gas furnace heats this section of the building, and there is central A/C. Exterior openings include utility pipe penetrations, windows, and three personnel doors (one to the shop area).

The western side (approximately three-fourths) is a one-story concrete block building. It is a repair shop for large trucks, with a shop office on the eastern side and a paint booth on the western side. The ceiling is 24 feet high; the shop office has an 8-foot drop ceiling. The shop floor is bare concrete, and there are visible cracks in areas. A floor drain leads to the sewer. There is evidence of spills on the truck bay area floor. The shop office has a tile floor. This section of the building is not insulated and not airtight. There is an overhead radiant heating system and used oil stove in the shop. During the building survey, strong paint odors were observed in the paint booth. Exterior openings include vents, fans, utility pipe penetrations, 10 bay doors large metal roll-up doors, and personnel doors. The bay doors are kept open during work hours.

2.6.2 PARCEL 5171 - B&G TRUCKING BUILDING 2

The building is a single-story commercial-use building, constructed prior to 1968 (Figure 25). The building footprint is 5,000 ft^2. The building is used for large truck repair with an office and break room area on the southern side. The concrete slab is on-grade with unsealed joints; there is one large floor drain, and there are visible cracks and staining in areas. The building is 20 feet high. There is a second story within the building over the office and break room area; the ceilings are 8 feet high. The shop area ceiling is 20 feet high. A forced air natural gas furnace in the office area centrally heats the building. An overhead radiant heating system and floor fans are present in the shop area. The building is not insulated and is not air tight. Exterior openings include vents, utility pipe penetrations, windows, personnel doors, and one large roll-up door. The roll-up door is kept open during work hours. The building is occupied weekdays from 7 a.m. to 5 p.m. by two adult workers.

2.6.3 PARCEL 5171 - B&G TRUCKING BUILDING 3

The building is a single-story commercial-use structure, erected prior to 2000 (Figure 26). The building footprint is 1,250 ft^2. The building is composed of canvas steel frame, covered with fabric and placed on asphalt, with retractable canvas flaps at both ends, and is used for sandblasting. The structure floor is cracked and damp. No HVAC systems are present in the structure. The building is occupied as needed weekdays from 7 a.m. to 5 p.m.

2.6.4 PARCEL 5171, BUILDING 4

This building was not identified during the June 2011 building survey; it was identified during a site visit on September 20, 2011. The building footprint is 495 ft^2. It appears to have been vacant for multiple years. It is surrounded by dense vegetation.

2.7 PARCEL 5172

2.7.1 PARCEL 5172 - S&J PRECISION AND OVERSTREET PAINTING BUILDING 1

The building is a single-story, industrial-use building, constructed in the 1950s (Figure 27). The building is divided into two equal sections: north and south sides. The total building footprint is 11,600 ft^2. The building is concrete block with brick front. The building has a concrete on-grade slab. The ceilings are 16 feet high. Exterior openings include utility pipe penetrations, windows, and personnel and bay doors.

S&J Precision uses the north side of the building. It is mainly comprised of a metal working shop with a warehouse and some office space. The shop and warehouse have bare concrete floors; there are visible cracks in areas. The building floor contains two floor drains. The rear drain and warehouse floor are stained. The office space on the north side has an elevated floor with floor tile (likely asbestos containing) and wall-to-wall carpeting on top. The building is not insulated, relatively air tight, with sealed windows. The building is centrally heated by a forced air natural gas furnace. Central A/C is also present. The building is occupied weekdays from 6 a.m. to 5 p.m. by five adult workers.

Overstreet Painting uses the south side of the building. This section of the building could not be accessed during the building survey. The building appeared vacant (looking through the window). There is a bare concrete floor. There is a south office area similar to the north office area on the S&J Precision side.

2.7.2 PARCEL 5172 - FORMER A-EVANS AIR FILTER SERVICE BUILDING 2

The building is a single-story, commercial-use building, constructed prior to 1959 (Figure 28). As of the building survey, the building recently had become vacant; A-Evans Filter Service used it formerly. The building footprint is 2,886 ft^2. The building has a concrete on-grade slab with sealed joints. The building is divided into two sections.

The northern section (approximately one-fifth) is a one-story brick building. It was used formerly as office space; there are two single offices. The building is 10 feet high with 8-foot drop ceilings. There is wall-to-wall carpeting. A forced air natural gas furnace centrally heats this section of the building; it is heated from floor vents, with return air through wall vents. Central A/C is also present. Exterior openings include utility pipe penetrations, office windows, and two personnel doors (one to the shop).

The southern section (approximately four-fifths) is a one-story concrete block building that is 15 feet high. There is a 6-foot-high metal shed attached to the south side; it could not be accessed during the building survey. This section of the building formerly was used for grease filter washing and filter storage. The bare concrete floor has an area of heavy staining in the former wash are on the north side. There are numerous small- to mid-sized floor cracks. It is not insulated and not airtight. An overhead gas heater heats the shop area. Exterior openings include vents, utility pipe penetrations, a bay door, and two personnel doors.

2.7.3 PARCEL 5172 – BUILDING 3

Building 3 was not accessible during the building survey. The building footprint is 721 ft^2.

2.8 PARCEL 5173 - SIM TRAINER BUILDING 1

The building is a single-story commercial-use building (Figure 29). It was constructed in three stages: the northern and central portions were constructed before 1956, the western addition was constructed before 1959, and the southern addition was constructed before 1968. The building is used as a shooting range. The southern section is office and classroom space. The central section is the shooting range. The northern section is primarily storage space with a combat training room. The western section is not used and is not accessible. The building footprint is 8,250 ft^2. The building has a concrete on-grade slab with unsealed joints.

The majority of the building has exposed concrete floors. At the time of the building survey, the combat training room floor had been freshly coated with epoxy paint. The floor in the shooting range had been painted. There are large floor cracks present in the center of shooting range and north storage area. In the northern portion of the building, heavy floor staining is visible, and an oil odor is noticeable. The building is heated by forced air natural gas ceiling units. An additional air handling unit operates during shooting range hours; air is vented from the range out to the roof and fresh air is supplied where customers stand to shoot. Central A/C is also present in the office and classroom areas, supplied by a separate furnace. Exterior openings include vents, fans, windows, and two roll-up doors. One adult worker (4-hour shifts) and customers occupy the building during business hours.

2.9 PARCEL 5174 - COMMAND ROOFING BUILDING 1

The building is a single-story, commercial-use storage building, constructed prior to 1968 (Figure 30). The building is used by Command Roofing for roofing material storage. There is a former office space on the eastern side that is not currently in use. The building footprint is 12,500 ft^2. The building has a concrete on-grade slab. Areas A to E are shown on Figure 30. Areas A (approximately 12 feet in height) and B (approximately 16 feet in height) are constructed with brick, and contain poorly sealed windows. Spray-on insulation, possibly containing -asbestos, is present in Area B. Areas C (approximately 24 feet in height) to E were constructed with steel beams and metal siding. No HVAC systems were in use as of June 2011. The building is not air tight, and is damp and moldy, with visible evidence of water staining in office Area A. The building floor slab is in poor condition, with cracks and unsealed joints throughout the building, and is particularly fractured in Areas D and E. Through Areas B and E, heavy floor staining is present. Exterior openings include office windows, personnel doors, sliding and roll-up doors. Two adult workers infrequently occupy the building at variable times for short periods for material pickup.

2.10 PARCEL 5175 - FORMER ALLIANCE EQUIPMENT AND SUPPLY BUILDING 1

The building is a single-story, commercial-use building, constructed prior to 1949(Figure 31). Alliance Equipment and Supply used the building formerly, but the building was being vacated at the time of the building survey. The building footprint is 4,557 ft^2. The building has a concrete on-grade slab with unsealed joints. The building is constructed of concrete block. There is a former office area on the eastern side. The central section is retail and warehouse/storage space. The western section (rear storage shed) is an addition constructed of steel frame with plywood walls and steel cladding.

A crawl space may be present on the south side. There is a shallow concrete pit present in the southwest corner of warehouse. Large sealed floor cracks are present in the middle portion of the building. The office area has wall-to-wall carpeting that is in poor condition. CRA observed floor staining in the warehouse and rear storage shed. A gasoline UST was removed from the former Conway Fence facility in 1990 on this Parcel. The window seals are in poor condition. At the time of the building survey, the overhead doors were open. The building is centrally heated by a forced air natural gas furnace. Central A/C is also present in the retail and office areas. A window unit A/C is present in the northern portion of building. Exterior openings include vents, fans, utility pipe penetrations, windows, and overhead and personnel doors. At the time of the building survey, the tenant was about to vacate the premises.

3 DATA QUALITY OBJECTIVES

The Data Quality Objectives (DQOs) for the VI Study, sampling strategy, and methodologies are discussed in further detail below.

A simplified discussion of the DQO steps for the VI Study is presented below.

Step 1: State the Problem

VOCs (including naphthalene) and methane are present in landfill material, groundwater and/or soil gas in the vicinity of multiple buildings on or immediately adjacent to the Site. Soil vapor samples collected from soil gas probes adjacent to three on-Site buildings, and 50 ft from a fourth building, contained VOC concentrations that are greater than industrial risk-based screening levels corresponding to an Excess Lifetime Cancer Risk (ELCR) of 1×10^{-4} or Hazard Index (HI) of 1 in indoor air assuming a default attenuation factor of 0.1. Concentrations of explosive gases (reported as methane) exceeded the LEL for methane in several soil gas probes in close proximity to buildings on or immediately adjacent to the Site. As detailed in the Dispute Resolution Agreement.

> *There are a number of operating businesses located on the Site, above or immediately adjacent to fill material and in close proximity to the gas probe locations where elevated levels of VOC and methane were detected.*

In addition, there is at least one residential building located in close proximity to soil gas probe GP09-09, where elevated concentrations of VOCs were detected.

Additional data are required to determine if VOCs (including naphthalene) and methane present in landfill material, groundwater, or soil gas in the vicinity of multiple buildings on or immediately adjacent to the Site currently have the potential to pose unacceptable VI health risks or explosion hazards. Additional data (i.e., concurrent indoor, outdoor, and sub-slab soil vapor [or crawl space air] sampling data) will be required to determine if the VI pathway is currently causing indoor air VOC concentrations in exceedance of the IASLs for mitigation (see Section 5 and Table 7) at buildings where VOCs are measured in sub-slab soil vapor (or crawl space air) at concentrations exceeding the SVSLs (or CSSLs) for further investigation (see Section 5 and Tables 5 and 6) during either the Round 1 or 2 sampling events.

Step 2: Identify the Goals of the Study

- Determine whether sub-slab soil vapor, crawl space air, and/or indoor air VOC concentrations at the VI Study buildings designed for occupancy are Site-related (and, for crawl space and indoor air, are due to VI), and causing an ELCR or HI above regulatory targets using the screening levels presented in Tables 5 through 7, the flow chart presented on Figure 2, and Section 5.2.

- Determine whether concentrations of methane beneath or within each VI Study building are Site-related (and, for crawl space air and indoor air, are due to VI) and exceed screening levels based on the LEL for methane in indoor air, crawl space air or sub-slab soil gas. The methane screening levels are detailed in Section 5.4 and the flow chart presented on Figure 2.
- Identify buildings where additional VI investigation or mitigation actions may be necessary (see Sections 5.2 – 5.4, Tables 5 through 7, and the flow chart presented in Figure 2).
- Measure sub-slab soil vapor, crawl space air, and/or indoor air VOC and methane concentrations under assumed worse case conditions (i.e., winter and mid-summer) at locations where VOCs and methane are not detected or are detected below regulatory target levels for mitigation (see Section 4.0 and Section 5.4).

Step 3: Identify Information Inputs

Information inputs include:

- Existing groundwater, landfill material, and soil gas data
- Building characteristics and Building Survey information
- Sub-slab soil vapor, crawl space air, indoor air, and/or outdoor air VOC and methane data that will be collected during two to four separate field events (i.e., the Round 1 sampling event with follow-up sampling if necessary in the winter, and the Round 2 sampling event with follow-up sampling if necessary in mid-summer) under this Work Plan following the decision rules presented in Section 5.4 and in Figure 2

Step 4: Identify the boundaries of the Study

The VI Study parcels were selected during the December 10, 2010, Dispute Resolution Agreement. The buildings located on these parcels are included in the VI Study; the buildings are detailed in Sections 1.2 and 2, in Table 1 and on Figure 4.

Step 5: Develop the Analytic Approach

Before sample collection, sub-slab soil vapor probes will be installed, purged, and leak checked at buildings with slabs.

As detailed in Section 1.3, sub-slab soil vapor, crawl space air, indoor air, and/or outdoor air samples will be collected over 8 or 24 hours (for industrial/commercial and residential use buildings, respectively) in Summa canisters equipped with flow controllers at the VI Study buildings that are designed for occupancy. Sub-slab soil vapor samples will be collected from the sub-slab soil vapor probes, following purging in accordance with the FSP. The sampling procedures are detailed in Section 4. Sub-slab soil vapor, crawl space air, indoor air, and/or outdoor air samples will be submitted for analyses of VOCs (including naphthalene) in accordance with the requirements of the QAPP (CRA 2008) and USEPA Toxic Organics (TO)-15 (TO-15) Method.

Sub-slab soil vapor, crawl space air, indoor air, and/or outdoor air also will be field screened for methane and carbon dioxide (the main components of LFG) at each of the VI Study buildings. The field measurement procedures are detailed in Section 4. A subset of the sub-slab soil vapor, crawl space air, and indoor air samples (equal to 20 percent or more of the total number of samples) will be submitted for analysis of methane by ASTM Method D1946, in order to confirm field methane readings (Section 4.2.1.3).

Step 6: Specify Performance or Acceptance Criteria

The VI study decision rules are presented in Section 5.4.

Table 8 presents the TestAmerica routine and low-level reporting detection limits (RDLs) and method detection limits (MDLs) for routine and low-level TO-15 analysis. The routine RDLs and MDLs are less than, and therefore, meet the screening levels, with some exceptions. 1,1,2,2-Tetrachloroethane; 1,2,4-trichlorobenzene; bromodichloromethane, dibromochloromethane, and naphthalene routine RDLs are greater than the residential screening levels for sub-slab soil vapor and indoor air; however, the routine MDLs for these parameters meet the residential screening levels for sub-slab soil vapor and indoor air (ECLR = 10^{-5}, HQ = 1 in indoor air assuming a default attenuation factor of 0.1). The low-level RDLs meet the residential screening levels for these parameters. However, the low-level method only provides a limited analyte list. Therefore, the regular method will be used to analyze the VI Study samples and the low-level method will be used in addition to analyze residential sub-slab soil gas and indoor air samples for 1,1,2,2-tetrachloroethane, bromodichloromethane, dibromochloromethane, and naphthalene to ensure that the reporting limits are less than the screening levels. 1,2,4-Trichlorobenzene is not on the low-level method analyte list; therefore, it will be by the regular method. The routine and low-level RDLs and the routine MDL for 1,2-dibromoethane (ethylene dibromide) are greater than industrial and residential screening levels; however, 1,2-dibromoethane was not detected in any groundwater, soil, or soil gas sample collected from Site investigative locations and is therefore unlikely to be a contaminant of concern for the VI Study. Therefore, 1,2-dibromoethane will be analyzed by the regular method.

If a different analytical laboratory is selected to perform the TO-15 analysis, then CRA will ensure that the RDLs are less than the applicable screening levels for all VOCs by using any combination of the regular, low-level, or select ion monitoring (SIM) mode for TO-15. Exceptions may occur, such as 1,2-dibromoethane discussed above, if the VOC is not known to be Site-related (i.e., detected in any groundwater, soil, or soil gas sample collected from Site investigative locations to date).

Step 7: Develop the Plan for Obtaining Data

See Section 4 below, for detailed procedures proposed in order to obtain the required data. Indoor air, crawl space air, and sub-slab soil vapor samples will be located to provide adequate coverage of the entire building, while being biased towards areas where greater concentrations of historic landfill material, groundwater or soil vapor methane and VOC (including naphthalene) concentrations were recorded.

4 PROPOSED SAMPLING ACTIVITIES

CRA used the CSMs to develop the VI Study sampling plans (i.e., number, type, and location of samples) for each building. In determining the number and type of samples, CRA considered the following information from the relevant guidance documents: Section 6.2.3 of USEPA (2010) and Section 4.7 of Ohio EPA (2010). CRA did not include lean-tos, carports, kennels (unless contained within a larger building), open-sided buildings, etc. in the sampling program.

Section 6.2.3 of USEPA, 2010 states that "at least one SS sample should be collected from each property, if possible" and the sampling point should be located in the lowest point of the property (i.e., the basement or, where no basement is present, the ground floor) and approximately in the middle of the room where concentrations are expected to be highest while potentially having the greatest radius of influence for sub-slab vapor across the footprint of the basement. While not mandating a specific number of samples per building, USEPA, 2010 does note that "[p]roperties where the collection of more than one SS sample is particularly desirable includes schools and multi-family homes, basements where a concrete footer divides the basement into two sections, and when the area of the basement or slab exceeds 1,500 square feet (ft^2)." USEPA, 2010 also notes that "[r]ecommendations about how many SS samples to collect vary, ranging from one SS sample for every 330 ft^2 (or two to three samples for every average-sized home) to one SS sample for an average residential dwelling of 1,500 ft^2."

In Section 4.7 of Ohio EPA, 2010, Ohio EPA recommends the collection of at least two sub-slab soil gas samples with one sample taken in the center of the building's foundation. For foundations greater than 5,000 ft^2, Ohio EPA suggests that, at a minimum, sub-slab soil gas be collected from biased locations, e.g., directly over source areas, maximum ground water concentration areas or near preferential pathways. If indoor air sampling is subsequently needed, Ohio EPA states that the indoor air samples should be analyzed only for the site-related chemicals detected in subsurface media (e.g., landfill material, groundwater, exterior soil gas) or sub-slab soil gas.

The sampling activities that will be performed at the VI Study buildings will include sub-slab soil vapor, indoor air, crawl space air, and/or outdoor air sampling for VOCs and/or methane. The general VI Study sampling strategy was presented in Section 1.3. The following additional guidelines were used for developing the sampling plans for each building: (1) multiple locations will be sampled at buildings with footprints larger than 1,500 ft^2 and/or multiple interior compartments (i.e., separate indoor air zones), and (2) the samples for VOC analysis will be collected in 6-liter Summa canisters equipped with flow controllers set to collect the samples over an 8-hour period for industrial and commercial buildings and a 24-hour period for residential buildings. The proposed sampling strategy and the rationale used in developing the strategy for each VI Study building are provided on Table 1.

CRA will collect a minimum of two samples from each location at each VI Study building unless mitigation is performed after the first sampling event. The Round 1 and 2 sampling events will be approximately 6 months apart to account for seasonal changes. The Round 1 sampling event will be performed in the winter when the surrounding ground is frozen and VI is expected to be highest. If follow-up sampling is required based on the results of the Round 1 sampling event (see Section 5.4), then the follow-up sampling event will also be performed in the winter. The Round 2 sampling event will be performed in the drier mid-summer when methane and VOC generation within the landfill may be highest (e.g., see Table 2 for GP-20 September 2009 and January 2011 sample results). All of the sub-slab soil vapor, crawl space air, indoor air, and outdoor air sample locations at each of the VI Study buildings from the Round 1 and the Round 1 follow-up sampling events (if necessary) will be resampled during the Round 2 sampling event unless mitigation has already been performed at a building. If follow-up sampling is required based on the results of the Round 2 sampling event (see Section 5.4), then the follow-up sampling event will also be performed in the summer.

The field events will be performed by at least two CRA field staff and are expected to take approximately 2 to 3 weeks each. During the first sampling event, a private utility location company will perform a utility clearance before sub-slab soil vapor probe installation at each building.

Sampling will be not be performed during storm events or within 48 hours of a significant rain event (i.e., greater than 1 inch of rain in a 24-hour period) because of the potential influence such conditions may have on indoor air, outdoor air, and sub-slab soil vapor. Information on weather conditions (including barometric pressure, air temperature, wind direction, and wind speed) in Moraine, Ohio, during the sampling event will be obtained from Weather Underground's Web site (2011).

The work proposed in this Work Plan will be performed in accordance with the USEPA-approved Field Sampling Plan (FSP), Quality Assurance Project Plan (QAPP), and Site-Specific Health and Safety Plan (HASP), and associated addenda that are submitted as Appendix C to this Work Plan.

4.1 SAMPLING LOCATIONS

The proposed VI Study sampling locations were selected to provide spatial coverage of each building with some bias toward the nearby landfill material, groundwater, and/or soil gas sample locations with elevated VOC and/or methane concentrations. If only one sampling location was proposed for a building, it would be placed toward the center of the building. If multiple sampling locations were proposed for a building, at least one would be placed toward the center of the building. Sub-slab soil vapor sampling locations will be at least 5 feet from exterior walls. Suspected asbestos-containing floor tiles were identified in the north office wing of Building 1 on Parcel 5172; sub-slab soil vapor probes will not be installed in this area.

Indoor and crawl space air proposed VOC sampling locations were placed toward the center of the building. The indoor air methane and carbon dioxide field monitoring will be performed near each of the sub-slab soil vapor probe or crawl space air locations at each building. Crawl space air methane and carbon dioxide field monitoring will be performed at each of the crawl space air VOC sample locations. The indoor and outdoor air Summa canisters and field meter inlets will be placed at a sample height approximately 3 to 5 feet above the slab or ground surface (approximate breathing zone height). The crawl space air sample and field meter inlets will be at least several inches above the slab or ground surface.

The proposed sampling locations for each building are shown on Figures 6 through 31. Contingency indoor air sampling locations are included in these figures, and these locations will be sampled if follow-up sampling is required based on the Round 1 or 2 sampling event results as discussed in Section 5.4. Sample locations may require adjustment in the field depending on the presence of utilities and owner/tenant concerns. Any adjustments will be agreed with USEPA or USEPA's on-site representative at the time of sampling.

An outdoor air sample will be collected for VOC analysis at parcels where indoor or crawl space air samples are collected for VOC analysis to assess ambient concentrations at and adjacent to the buildings at the time of sampling. Additionally, one outdoor air sample will be collected each day sub-slab soil vapor samples are collected for VOC analysis. The outdoor air sample will be collected near the buildings being sampled that day. If multiple parcels are sampled in a single day that are greater than 1,000 feet apart, then multiple outdoor air samples will be collected to ensure local-scale outdoor air concentrations are characterized. Outdoor air methane and carbon dioxide concentrations will be measured each day at each of the VI Study parcels that are being sampled that day. The specific outdoor air sampling locations will be determined in the field at the time of sampling. The outdoor air samples will not be collected in the immediate vicinity of obvious outdoor VOC and/or methane sources (e.g., gasoline powered equipment).

4.2 SAMPLING PROCEDURES

The procedures for the installation and sampling of the sub-slab soil vapor probes and the collection of indoor, crawl space and outdoor air samples are described below. Additional detail is provided in the standard operating procedures in Appendix B.

Before sampling, the buildings will be resurveyed to determine if conditions have changed since the June 2011 building surveys. The Building Physical Survey Questionnaire will be updated as necessary for each building.

Globe Equipment (Buildings 1 and 2 on Parcel 3207) has requested that sample collection occur outside of normal operating hours, i.e., on the weekend, to minimize disruption to the business. To avoid diurnal effects on sub-slab soil vapor concentrations, the samples will be collected during the weekend between 9 a.m. and 5 p.m. CRA will ensure that the heating, ventilation, and air conditioning (HVAC) equipment system is operating in the same manner at the time of sampling as it would during normal operating hours.

4.2.1 SUB-SLAB SOIL VAPOR PROBE INSTALLATION AND SAMPLING

Sub-slab soil vapor probe installation and sampling will be performed in accordance with the SOP in Appendix B.1, which is an addendum to the FSP.

Due to safety concerns, CRA will avoid installing sub-slab gas probes in the vicinity of underground utilities. All proposed sub-slab soil vapor probe locations will be cleared prior to installation through use of a concrete scanner (i.e., hand-held Ground Penetrating Radar unit or equivalent) operated by a private utility locator. Specific details regarding the installation and sampling of the sub-slab vapor probes are provided below.

4.2.1.1 SUB-SLAB SOIL VAPOR PROBE INSTALLATION

As described in detail in the SOP for sub-slab soil vapor probe installation (Appendix B, addendum to the FSP), CRA will use a rotary hammer drill a “shallow“ (approximately 1 inch deep) outer hole (7/8 inch in diameter) that partially penetrates the floor slab. CRA will then drill a smaller diameter inner hole (3/8 inch in diameter) into the center of the outer hole, through the floor material and approximately 3 inches into the sub-slab bedding material to create an open cavity.

CRA will clean cuttings from the outer and inner holes using a towel moistened with distilled water or a small portable vacuum cleaner.

To construct the probes, CRA will cut chromatography grade 316 stainless steel tubing (1/4 inch in diameter) to a length that allows the probe to float within the slab thickness to avoid obstruction of the probe with sub-slab bedding material. To complete the probe, female thread connectors will be used for compression fittings and attached to the tubing. A probe cap will be placed on the probe. CRA will construct the probes prior to drilling to minimize exposure time, or venting, of the sub-slab bedding material through the open hole.

CRA will place the sub-slab soil vapor probe in the hole so that the top of the probe is flush with the top of the floor. The top of the probe will have a recessed brass plug. CRA will push or inject 100 percent pure Portland cement slurry into the annular space between the probe and the outer hole. The cement will be allowed to dry for at least 24 hours prior to sampling.

4.2.1.2 SUB-SLAB SOIL VAPOR PROBE PURGING AND LEAK CHECKING

CRA will complete leak testing prior to sample collection by injecting helium into a shroud covering the sub-slab probe, and monitoring for the presence of helium in the purged sub-slab soil vapor using a field meter.

CRA will purge stagnant air from the sub-slab soil vapor probes into Tedlar bags with a lung box pump. CRA will purge one to two liters of sub-slab soil vapor from the probe assembly, into a Tedlar bag. One liter of sub-slab soil vapor will be greater than three volumes from the sub-slab soil vapor probe assembly (probe and attached Teflon® tubing); however the additional purged sub-slab soil vapor is necessary for leak testing and field screening with a photoionization detector (PID) for total VOCs. This also ensures that the sub-slab soil vapor sample is representative of actual vapor concentrations within the sub-slab bedding material. The Tedlar bags will be field screened with the PID and helium detector and emptied outside the building to avoid releasing contaminants within the building.

Elevated methane concentrations (above approximately 5 percent) can interfere with the helium detector, resulting in false positive helium readings. Methane concentrations in sub-slab soil vapors will be measured (field screened) in the purged sub-slab vapor before measuring helium concentrations. If methane is not present at concentrations above approximately 5 percent, then the helium readings are not biased. If methane is present at concentrations above approximately 5 percent and a Summa canister is being collected for VOC analysis, then the sample will be analyzed for helium by the analytical laboratory. However, if methane is present and a Summa canister is not being collected for VOC analysis, the probe will be temporarily patched with modeling clay (to ensure a leak is not present), and the probe will be sampled for methane under the assumption that a leak is not present.

4.2.1.3 SUB-SLAB SOIL VAPOR PROBE SAMPLING FOR METHANE

Following purging and leak checking of the sub-slab soil vapor probe, CRA will collect a second Tedlar bag sample of sub-slab soil vapor to measure pre-sample values of methane, oxygen, and carbon dioxide, using appropriate meters. The Tedlar bag will be field screened and emptied outside the building to avoid releasing contaminants within the building.

The sub-slab soil vapor samples will then be collected into Summa Canisters as detailed in Section 4.2.1.4 at buildings designed for occupancy that have slabs. Following sample collection, CRA will collect sub-slab soil vapor from the probes into Tedlar bags with a lung box in order to measure post-sample methane, carbon dioxide, and oxygen values.

Methane, carbon dioxide, and oxygen levels also will be measured twice at least 8 hours apart at buildings that are not designed for occupancy that have slabs (i.e., where Summa canister sampling will not be performed). Approximately 0.5-liter of sub-slab soil vapor will be purged from these probes before the second measurement.

The following information from the USEPA (2005) Guidance for Evaluating Landfill Gas Emissions from Closed or Abandoned Facilities will be considered when selecting times for measuring methane levels: "Highest methane concentrations occur in the warmer summer months, and concentrations are higher during the heat of the day compared to measurements taken during morning hours. Landfill gas levels in soils tend to be higher during dry periods and lower after significant rainfall events."

Total VOCs in sub-slab soil vapor will be measured with a PID both times the methane, carbon dioxide, and oxygen concentrations are measured at each probe.

CRA will measure the levels of methane, carbon dioxide and oxygen in the sub-slab vapor beneath the structure[2] using a portable combustible gas meter, specifically RKI GX-2003, and LandTec GEM 2000. RKI GX-2003 responds to all combustible gases present (reported as percent LEL), and also displays percent volume of methane. LandTec GEM 2000 reports the concentration of methane in units of percentage of the lower explosive limit (LEL) of methane (i.e., 0 to 100 percent of LEL). Both the RKI GX-2003 and LandTec GEM 2000 measure the concentrations of oxygen, carbon dioxide, carbon monoxide, and hydrogen sulfide.

To confirm methane field readings, a subset of the sub-slab soil vapor samples collected in Summa canisters for VOC analysis (equal or greater than 20 percent of the total number of samples) will be submitted for analysis of methane by ASTM Method D1946. The confirmatory

[2] As noted above, sub-slab measurements will be made from the Tedlar bags and not directly from the sub-slab.

samples will be used to verify the non-detect to low range methane readings measured with the field meters (i.e., if methane concentrations are measured with the field meter above the screening levels, an immediate or rapid response will be necessary to eliminate the explosive hazard and confirmatory laboratory samples aren't necessary).

4.2.1.4 SUB-SLAB SOIL VAPOR SAMPLING FOR VOCs

The sub-slab soil vapor samples will be collected into 6 L Summa Canisters equipped with flow controllers set to collect the sample over an 8-hour period for commercial and industrial buildings, and a 24-hour period for residential buildings.

During sample collection, CRA will check each Summa Canister periodically to ensure that the canister pressure has not reached zero; at a minimum, the canisters will be checked several hours before the end of the sampling period. Canisters that reach zero pressure will not be analyzed and a new sample will be collected at these locations.

4.2.2 INDOOR AIR SAMPLING FOR VOCs

Indoor and crawl space air sampling will be performed in accordance with the SOP for indoor, outdoor, and crawl space air sampling (Appendix B.2, addendum to the FSP).

The indoor and crawl space air samples will be collected into 6-liter Summa canisters equipped with flow controllers set to collect the sample over an 8-hour period for commercial and industrial buildings, and a 24-hour period for residential buildings. The indoor air sampling period will coincide with the sub-slab soil gas sampling period at each building where both sample types are being collected.

When indoor or crawl space air samples are collected, CRA will also collect an outdoor air sample adjacent to the structure as per CRA's SOP.

CRA will check each Summa Canister periodically to ensure that the canister pressure has not reached zero; at a minimum, the canisters will be checked several hours before the end of the sampling period. Canisters that reach zero pressure will not be analyzed and a new sample will be collected at these locations.

4.2.3 INDOOR AND CRAWL SPACE AIR SAMPLING FOR METHANE

Crawl space air methane, carbon dioxide, and oxygen levels will be measured at the beginning and end of the crawl space air Summa canister collection period.

Indoor air methane, carbon dioxide, and oxygen levels will be measured at each building when sub-slab soil vapor or crawl space air levels are measured (i.e., at the beginning and end of the Summa canister collection period). Methane, carbon dioxide, and oxygen levels also will be measured twice at least 8 hours apart at buildings that are not designed for occupancy that have slabs (i.e., where Summa canister sampling will not be performed).

CRA will measure the methane, carbon dioxide and oxygen levels in indoor and crawl space air using portable combustible gas meters, specifically RKI GX-2003 and LandTec GEM 2000, as discussed in Section 4.2.1.3 above.

In addition, a subset of the indoor and crawl space air samples collected in Summa canisters for VOC analysis (equal or greater than 20 percent of the total number of samples) will be submitted for analysis of methane by ASTM Method D1946, to confirm methane field readings. As only one indoor air and two crawl space air samples are proposed for the initial round of sampling, one sample will be submitted to the laboratory for analysis of methane. One of the two crawl space air samples will be submitted to the laboratory for analysis of methane; the sample with the higher methane reading that is below the screening levels will be selected. If either of the crawl space air samples has methane concentrations measured with the field meter above the screening levels, then that sample will not be sent to the laboratory for analysis of methane because an immediate or rapid response will be necessary to eliminate the explosive hazard and confirmatory laboratory samples are not necessary.

4.2.4 <u>OUTDOOR SAMPLING FOR VOCs</u>

Outdoor air sampling for VOCs will be conducted in accordance with the SOP for indoor, outdoor, and crawl space air sampling (Appendix B.2, addendum to the FSP).

The outdoor air samples will be collected into 6-liter Summa canisters equipped with flow controllers set to collect the sample over an 8-hour period for commercial and industrial properties, and a 24-hour period for residential properties. The outdoor air sampling period will coincide with the indoor and crawl space air sampling period. Measures will be taken to reduce the potential for rainwater to enter the Summa canister; the canister may be placed under a protective cover or the inlet will be turned downward.

CRA will check each Summa Canister periodically to ensure that the canister pressure has not reached zero; at a minimum, the canisters will be checked several hours before the end of the sampling period. Canisters that reach zero pressure will not be analyzed and a new sample will be collected at these locations.

Outdoor air methane, carbon dioxide, and oxygen levels will be measured at the beginning and end of the outdoor air Summa canister collection period. The methane, carbon dioxide, and oxygen levels will be measured in indoor and crawl space air using a LandTec GEM 2000 portable LFG analyzer. Laboratory confirmation of outdoor air methane field readings will not be performed, as it is unlikely methane will be detected in outdoor air and the field screening is considered to be adequate for the purposes of this study.

4.2.5 QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

Field duplicate samples will be collected at a frequency of 10 percent per sample media for VOC analysis. The sample media are (1) sub-slab soil vapor and (2) indoor, crawl space, and outdoor air. Duplicate samples will be collected in the same manner and from the same location as the normal samples are collected. A stainless-steel T-connector will be used to connect two Summa canisters together so the parent and duplicate sample are collected concurrently from the same intake.

Quality assurance (QA)/quality control (QC) for the methane field screening results will be accomplished by: 1) measuring methane twice (at least 8 hours apart) at each sub-slab soil vapor, indoor air, and crawl space air location; 2) submitting 20 percent of the sub-slab soil vapor Summa canisters and 20 percent of the indoor and crawl space air Summa canisters for laboratory analysis of methane by ASTM Method D1946.

4.2.6 SAMPLE ANALYSIS

CRA will submit the Summa Canister samples under chain of custody protocols to the laboratory for VOCs analysis in accordance with USEPA TO-15. The full TO-15 list will be reported for each sample. The TO-15 list will include at a minimum the constituents listed on Tables 2 – 6. The VOC samples collected from residential buildings will also be analyzed by the TO-15 low-level method for 1,1,2,2-tetrachloroethane, bromodichloromethane, dibromochloromethane, and naphthalene in order to achieve reporting limits less than the screening levels (see Section 3, Step 6).

Soil concentrations of benzo(b)fluoranthene were greater than USEPA industrial soil criteria in samples collected from Valley Asphalt Parcel 5054 (TT-5 and TT-7). According to Table 1 of the *OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)* (USEPA 2002), benzo(b)fluoranthene is sufficiently toxic and volatile for VI to be a potential concern. However, benzo(b)fluoranthene has a high molecular weight (252.3 grams per mole) and low vapor pressure (5×10^{-7} mm mercury at 20 to 25 degrees Celsius [ToxProbe Inc. 2011]), and does not easily volatilize.

Further, sub-slab vapor sampling techniques to determine the soil vapor concentration of benzo(b)fluoranthene are not available and ambient air or occupational health methods for PAH sampling are not readily transferable to sub-slab vapor sampling. There is insufficient data to develop benzo(b)fluoranthene soil volatilization to indoor air inhalation criteria (Michigan Department of Environmental Quality 2011). Therefore, CRA does not propose to include benzo(b)fluoranthene in the VI Study. In comments dated July 19, 2011, USEPA accepted the proposal to not include benzo(b)fluoranthene in the VI Study.

All Summa canisters used for the VI Study will be individually certified by the analytical laboratory to ensure they are free of contamination before collecting the samples. The results of this certification will be included in the VI Investigation Report.

A subset of the sub-slab soil vapor, crawl space air and indoor air samples (equal or greater than 20 percent of the total number of samples) will be submitted for analysis of methane by ASTM Method D1946, to confirm methane field readings.

5 DATA EVALUATION AND REPORTING

The VI assessment will be conducted using multiple lines of evidence and in accordance with USEPA Region 5 (2010), ITRC (2007), USEPA (2002), and Ohio EPA (2010) VI guidance. The sub-slab soil vapor, indoor air, and crawl space air data collected during the VI Study will be compared to the screening levels detailed in Section 5.2. Multiple lines of evidence will be considered when determining if the measured crawl space or indoor air concentrations are Site-related and due to VI. Recommendations for further investigation, mitigation, and monitoring will be made in accordance with the decision rules described in Step 6 of the DQOs (Section 3) and detailed in Section 5.4, which are based on Section 8 (Decision Making at Vapor Intrusion Sites) of the USEPA (2010) Region 5 Vapor Intrusion Guidebook.

5.1 DATA VALIDATION

Data quality validation will be performed to assess the effects of the overall field and analytical processes on the usability of the data before evaluation and reporting. CRA will review final results and supporting quality assurance/quality control (QA/QC data). CRA will complete a full data validation on the results, as the sub-slab soil vapor, crawl space air, indoor air, and outdoor air analytical results will be used to determine risks to receptors.

CRA chemistry staff will validate the analytical data in accordance with Section K.5.9.2 of the QAPP (CRA 2008).

5.2 SCREENING LEVELS

5.2.1 VOC SCREENING LEVELS

The screening levels for VOCs are based on the USEPA RSLs for air (USEPA 2011). The RSLs are derived assuming a 10^{-6} target ELCR level or a HI of 1. RSLs are not provided for several constituents; RSLs for similar constituents will be used as evaluation surrogates for these constituents (Tables 5 through 7). Some VOCs have both cancer and non-cancer based RSLs; it is important to consider both types of screening levels when calculating cumulative risks and hazards.

The USEPA released the final health assessment for trichloroethene (TCE) to the Integrated Risk Information System (IRIS) database on September 28, 2011. Updated TCE air RSLs were calculated using a sample spreadsheet that USEPA provided in the IRIS documentation[3] which includes an adjustment for the mutagenic mode of action (MMOA) for kidney cancer for the

[3] located at http://hero.epa.gov/index.cfm?action=search.view&reference_id=758648

cancer-based RSLs. The worksheets showing the TCE air RSL calculation are provided in Appendix D. The screening levels were then developed using the updated TCE air RSLs.

SVSLs were derived by applying the USEPA (2010) Vapor Intrusion Guidebook default soil gas-to-indoor air attenuation factor of 0.1 to the RSLs. Crawl space air screening levels (CSSLs) were derived by applying the USEPA (2010) Vapor Intrusion Guidebook default crawl space air-to-indoor air attenuation factor of 1 to the RSLs.

Industrial screening levels (based on the industrial air RSLs) will be used to evaluate the buildings with commercial or industrial use. Residential screening levels (based on the residential air RSLs) will be used to evaluate the residential buildings (i.e., Parcel 3253).

The most recent USEPA RSLs will be used to recalculate the VOC screening levels (Tables 5 – 7) prior to screening analytical data throughout the VI Study. The next round of updates to the RSLs will include the updated TCE toxicity factor, and the newest TCE RSL will be used to replace the one calculated for this Work Plan.

Multiple sets of screening levels for VOCs were derived from the RSLs:

- SVSLs for further investigation (i.e., concurrent indoor air and sub-slab soil vapor sampling within 30 days) corresponding to an ELCR = 10^{-6}, or HI = 0.1 in indoor air assuming a default attenuation factor of 0.1 (Table 5).
- SVSLs for monitoring (i.e., to determine if ongoing monitoring is necessary when measured indoor air VOC concentrations are below the indoor air screening levels [IASLs] for mitigation) corresponding to an ELCR = 10^{-5} or HI = 1 in indoor air assuming a default attenuation factor of 0.1 (Table 5).
- CSSLs for further investigation (i.e., concurrent indoor and crawl space air sampling within 30 days) corresponding to an ELCR = 10^{-5} or HI = 1 in indoor air assuming a default attenuation factor of 1 (Table 6).
- IASLs for mitigation corresponding to an ELCR= 10^{-5} or HI = 1 in indoor air (Table 7).
- IASLs for high priority / rapid response (i.e., mitigation within a few weeks) corresponding to an ELCR = 10^{-4} or HI = 10 in indoor air (Table 7).

5.2.2 METHANE SCREENING LEVELS

The methane screening levels were obtained from the Ohio Administrative Code (OAC) 3745-27-12 and the USEPA (2010) Vapor Intrusion Guidebook. The methane results will be compared to the following screening levels:

- SVSL for immediate response (i.e., immediately notify appropriate authorities [e.g., USEPA, Ohio EPA, fire department, and health district] and immediately eliminate explosive hazard through mitigation or removal): 100 percent of the LEL (OAC 3745-27-12). One hundred percent of the LEL for methane equates to methane levels of approximately 28,000 parts per million (ppm) by weight or 5 percent (50,000 ppm) methane by volume.
- IASL and CSSL for immediate response (i.e., immediately notify appropriate authorities [e.g., USEPA, Ohio EPA, fire department, health district] and immediately eliminate explosive hazard through mitigation or removal): 25 percent of the LEL (OAC 3745-27-12). Twenty-five percent of the LEL for methane equates to methane levels of approximately 7,000 ppm by weight or 1.25 percent (12,500 ppm) methane by volume.
- SVSL for rapid response (i.e., mitigation within weeks): 10 percent of the LEL (USEPA, 2010). Ten percent of the LEL for methane equates to methane levels of approximately 2,800 ppm by weight or 0.5 percent (5,000 ppm) methane by volume.
- IASL and CSSL for rapid response (i.e., mitigation within weeks): 1 percent of the LEL (USEPA, 2010). One percent of the LEL for methane equates to methane levels of approximately 280 ppm by weight or 0.05 percent (500 ppm) methane by volume.

5.3 DATA EVALUATION

The multiple lines of evidence that may be used to evaluate the VI Study data include, but are not limited to, the following:

- Sub-slab soil vapor, crawl space air, and indoor air VOC sample data compared to the screening levels detailed in Section 5.2;
- Cumulative cancer and non-cancer risks for each sub-slab soil vapor, crawl space air, and indoor air VOC sample;

- Sub-slab soil vapor, crawl space air, and indoor air methane field readings compared to the screening levels detailed in Section 5.2;
- Indoor air-to-sub-slab soil vapor VOC ratios;
- Indoor air-to-crawl space VOC ratios;
- Crawl space air-to-outdoor air VOC ratios;
- Indoor air-to-outdoor air VOC ratios;
- VOC ratios within and between samples;
- Building characteristics and survey results;
- Presence of potential indoor VOC sources;
- The 2009 soil vapor sample VOC and methane results (Tables 1 through 3); and
- Site geology and history.

The data collected during the VI Study will be used to update the CSM for each VI Study building. Recommendations for further investigation, mitigation, and remediation will be made in accordance with the decision rules described in Section 5.4.

5.4 DECISION RULES

The following decision rules will be used to determine if additional actions are required to further investigate or mitigate the VI pathway at the VI Study buildings.

5.4.1 DECISION RULES FOR VOC ANALYTICAL RESULTS

- Multiple lines of evidence will be considered when determining if the measured crawl space or indoor air concentrations are Site-related (i.e., from contaminated materials in the landfill area or from groundwater beneath the landfill) and are due to VI at each VI Study building. Example lines of evidence include, but are not limited to (1) indoor-to-outdoor and/or indoor-to-sub-slab VOC ratios; (2) building characteristics; (3) VOC ratios within and between samples; and (4) Site geology/history. Refer to the USEPA (2010) Region 5 Vapor Intrusion Guidebook for additional discussion.
- In general, decisions regarding mitigation to address the VI pathway at each VI Study building will be made considering indoor air and sub-slab soil vapor (or crawl space air) VOC levels. Site-related indoor air VOC levels from VI will be the primary determinant for mitigation actions. However, if sub-slab soil vapor concentrations are so elevated that there is a potential for future VI human health risk (e.g., if foundation conditions deteriorate or

pressure gradients change), then mitigation to prevent future exposure at a building may be required even if current IA concentrations do not exceed IASLs.

- In general, a no further action (as part of this work plan) decision for a VI Study building should be based on sampling data performed during assumed worst-case conditions; these depend on seasonal groundwater level and building heating and cooling factors, as well as seasonal conditions which may affect methane and VOC production within the landfill. Therefore, at this Site, a no further action decision (as part of this work plan) will be based on two rounds of sampling data under both potential worst-case conditions (i.e., both winter and mid-summer events should be included).
- The PRPs may decide to conduct concurrent indoor air sampling with the sub-slab soil vapor (or crawl space air) sampling during the Round 1 sampling event; or_perform mitigation in lieu of further investigation of the VI pathway at any of the VI Study buildings at any time.
- If only sub-slab soil vapor samples are collected and measured VOC levels meet or exceed applicable SVSLs or cumulative risks/hazards corresponding to a target ELCR of $1x10^{-6}$ or HI of 0.1 in indoor air assuming a default attenuation factor of 0.1 at any of the probes within a building during either the Round 1 or 2 sampling events, then CRA will immediately notify USEPA on behalf of the Respondents and collect concurrent indoor/outdoor air and sub-slab soil vapor VOC samples within 30 days of receiving the complete set of analytical results for that sampling event to further assess the VI human health risk at that building. However, if measured sub-slab soil vapor VOC levels exceed 1,000 to 10,000 times the applicable SVSLs or cumulative risks/hazards corresponding to a target ELCR of $1x10^{-6}$ or HI of 0.1 in indoor air assuming a default attenuation factor of 0.1 at any of the probes within a building during either the Round 1 or 2 sampling events, then a more rapid response may be required if the building is currently occupied. The rapid response will include expedited indoor air sampling and interim mitigation measures to reduce potential indoor air VOC concentrations due to VI such as HVAC modifications (e.g., increasing the outdoor air intake) and sealing cracks and other entry points in the slab. A rapid response is not necessary at unoccupied buildings as long as the Respondents ensure that the building remains unoccupied until indoor air sampling is performed.
- If only sub-slab soil vapor samples are collected and measured VOC levels are less than applicable SVSLs or cumulative risks/hazards corresponding to a target ELCR of $1x10^{-6}$ or HI of 0.1 in indoor air assuming a default attenuation factor of 0.1 during both Round 1 and 2 sampling events (i.e., winter and mid-summer) at all of the probes within a building, then no further action to investigate or mitigate the VI pathway is necessary at that building as part of this VI Work Plan.

- If only crawl space air vapor samples are collected and site-related measured VOC levels meet or exceed applicable CSSLs or cumulative risks/hazards corresponding to a target ELCR of 1×10^{-5} or HI of 1 in indoor air assuming a default attenuation factor of 1 during either the Round 1 or 2 sampling events (i.e., winter and mid-summer), then CRA will immediately notify USEPA on behalf of the Respondents and collect concurrent indoor/outdoor and crawl space air VOC samples within 30 days of receiving the complete set of analytical results for that sampling event to further assess the VI human health risk at that building. However, if measured crawl space air VOC levels exceed 10 to 100 times the applicable CSSLs or cumulative risks/hazards corresponding to a target ELCR of 1×10^{-5} or HI of 1 in indoor air assuming a default attenuation factor of 1 at any of the sampling locations within a building during either the Round 1 or 2 sampling events, then a more rapid response may be required if the building is currently occupied. The rapid response will include expedited indoor air sampling and interim mitigation measures to reduce potential indoor air VOC concentrations due to VI such as HVAC modifications (e.g., increasing the outdoor air intake) or venting of the crawl space (e.g., removing the trailer skirting), and sealing cracks and other entry points in the floor. A rapid response is not necessary at unoccupied buildings as long as the Respondents ensure that the building remains unoccupied until indoor air sampling is performed.

- If only crawl space air samples are collected and site-related measured VOC levels are less than applicable CSSLs or cumulative risks/hazards corresponding to a target ELCR of 1×10^{-5} or HI of 1 in indoor air assuming a default attenuation factor of 1 during both Round 1 and 2 sampling events (i.e., winter and mid-summer), then no further action to investigate or mitigate the VI pathway is necessary at that building as part of this VI Work Plan.

- If site-related indoor air VOC levels due to VI meet or exceed applicable IASLs or cumulative risks/hazards corresponding to a target ELCR of 1×10^{-4} or HI of 10 at any indoor air sample location within a building during any sampling event, then CRA will immediately notify USEPA and submit a work plan to perform rapid mitigation (i.e., within a few weeks) on behalf of the Respondents, including operation and maintenance, within 15 days of receiving the complete set of preliminary analytical data for that sampling event, to address the human health risk at that building. Additionally, interim mitigation measures should be performed at occupied buildings to reduce potential indoor air VOC concentrations due to VI such as HVAC modifications (e.g., increasing the outdoor air intake) and sealing cracks and other entry points in the slab or floor.

- If site-related indoor air VOC levels due to VI meet or exceed applicable IASLs or cumulative risks/hazards corresponding to a target ELCR of 1×10^{-5} or HI of 1 at any indoor air sample location within a building during any sampling event, then CRA will submit a work plan on behalf of the Respondents within 30 days of receiving the complete set of preliminary analytical data for that sampling event to perform mitigation (including operation and maintenance) to address the human health risk at that building. Additionally, interim mitigation measures should be performed at occupied buildings to reduce potential indoor air VOC concentrations due to VI such as HVAC modifications (e.g., increasing the outdoor air intake) and sealing cracks and other entry points in the slab or floor.

- If site-related indoor air VOC levels due to VI are less than applicable IASLs or cumulative risks/hazards corresponding to a target ELCR of $1x10^{-5}$ or HI of 1 and sub-slab soil vapor VOC levels are less than applicable SVSLs or cumulative risks/hazards corresponding to a target ELCR of $1x10^{-5}$ or HI of 1 in indoor air assuming a default attenuation factor of 0.1 at a building during at least two consecutive sampling events which include winter and mid-summer events, then no further action to investigate or mitigate the VI pathway is necessary at that building as part of this VI Work Plan.
- If site-related indoor air VOC levels due to VI are less than applicable IASLs or cumulative risks/hazards corresponding to a target ELCR of $1x10^{-5}$ or HI of 1 and sub-slab soil vapor VOC levels during any sampling event meet or exceed applicable SVSLs or cumulative risks/hazards corresponding to a target ELCR of $1x10^{-5}$ or HI of 1 in indoor air assuming a default attenuation factor of 0.1 at a building, then CRA will submit a monitoring plan on behalf of the Respondents for the building within 30 days of receipt of the complete set of preliminary analytical data from the second indoor air sampling event.

If the Round 1 or 2 sub-slab soil vapor or crawl space air VOC sampling results trigger further investigation (Table 5 and 6) (i.e., concurrent indoor air and sub-slab soil vapor [or crawl space air] VOC samples within 30 days of receiving the complete set of analytical results from that sampling event), then the indoor air contingency locations identified on Figures 6 – 31 and the indoor air sampling procedures detailed in Section 4.2.2.will be utilized. An additional work plan (or work plan addendum) will not be required.

5.4.2 DECISION RULES FOR METHANE ANALYTICAL RESULTS

- If sub-slab soil vapor methane levels meet or exceed 100% of the LEL (5 percent methane by volume) at any of the sub-slab soil vapor probes within a building during any sampling event, then CRA will immediately notify appropriate authorities (e.g., USEPA, Ohio EPA, fire department, health district) on behalf of the Respondents and immediately eliminate explosive hazard at that building through mitigation or removal (OAC 3745-27-12).

- If indoor or crawl space air methane levels meet or exceed 25% of the LEL (1.25% methane by volume) at any of the sample locations within a building during any sampling event, then CRA will immediately notify appropriate authorities (e.g., USEPA, Ohio EPA, fire department, health district) on behalf of the Respondents and immediately eliminate explosive hazard at that building through mitigation or removal (OAC 3745-27-12). Additionally, interim mitigation measures should be performed as soon as possible to reduce indoor air methane concentrations due to VI such as HVAC modifications (e.g., increasing the outdoor air intake) and sealing cracks or other entry points in the slab or floor.

- If sub-slab soil vapor methane levels meet or exceed 10% of the LEL (0.5% methane by volume) at any of the sub-slab soil vapor probes within a building during any sampling event, then CRA will immediately notify USEPA on behalf of the Respondents and perform rapid response (i.e., mitigation within a few weeks) to eliminate explosive hazard at that building (USEPA, 2010).

- If indoor or crawl space air methane levels meet or exceed 1% of the LEL (0.05% methane by volume) at any of the sample locations within a building during any sampling event, then CRA will immediately notify USEPA on behalf of the Respondents and perform rapid response (i.e., mitigation within a few weeks) to eliminate explosive hazard at that building (USEPA, 2010). Additionally, interim mitigation measures should be performed as soon as possible to reduce indoor air methane concentrations due to VI such as HVAC modifications (e.g., increasing the outdoor air intake) and sealing cracks or other entry points in the slab or floor.

- If sub-slab soil vapor methane levels are less than 10% of the LEL or crawl space air methane levels are less than 1% of the LEL (depending on if sub-slab soil vapor or crawl space air samples were collected at the building) AND indoor air methane levels are less than 1% of the LEL during both Round 1 and 2 sampling events (i.e., winter and mid-summer), then no further action to address explosive hazards are necessary at that building as part of this VI Work Plan (USEPA, 2010).

Immediate or rapid response actions to address explosive hazards will be performed regardless of occupancy status.

5.5 <u>REPORTING</u>

CRA will post the preliminary analytical results to the South Dayton Dump and Landfill file transfer protocol (ftp) site immediately upon receipt and the validated analytical results to the South Dayton Dump and Landfill file transfer protocol (ftp) site immediately upon completion of validation. CRA will notify USEPA immediately on behalf of the Respondents of any VOC or methane analytical results or field measurements that exceed the screening levels presented in Section 5.2 and Tables 5 – 7, or if cumulative risks/hazards exceed the ELCR or HI values that the screening levels are based on.

CRA will provide the results and corresponding evaluation after each sampling event to USEPA within 30 days of receiving the complete set of preliminary analytical data on behalf of the Respondents. Data tables showing the VOC and methane analytical data and the methane field measurements compared to the screening levels detailed in Section 5.2 and provided on Tables 5 through 7 will be included, and exceedances of the screening levels will be identified on the tables. Any deviations from this Work Plan will be discussed. The CSMs for the three and one-half buildings for which CSMs were not included in this Work Plan will be provided after the Round 1 sampling event. The buildings that require follow-up sampling or mitigation will be identified.

A final draft VI Investigation Report will provide a summary of each of the sampling events performed during the VI Study. The report will document the procedures and results of the VI Study sampling events. Summary data tables showing the VOC and methane analytical data and the methane field measurements at each of the VI Study sampling locations from each of the sampling events compared to the screening levels detailed in Section 5.2 and provided on Tables 5 through 7 will be included, and exceedances of the screening levels will be identified in the tables. The CSMs for each of the VI Study buildings will be updated with the VI Study sampling data and included in the report. The VI Study data will be evaluated as discussed in Section 5.3 and with the decision rules provided in Section 5.4. The report will be submitted within 60 days of receiving the complete set of preliminary analytical data from the final sampling event (i.e., either the Round 2 or Round 2 follow-up sampling event depending on the results of the Round 2 sampling events).

The VI Report will be finalized following receipt of comments from USEPA.

Additionally, CRA will prepare draft letters on behalf of the Respondents with analytical data tables and figures presenting the VI Study results for each of the buildings for USEPA to submit to the building owners and occupants after each of the sampling events.

If it is determined that mitigation is required at any of the VI Study buildings after any of the sampling events, then a mitigation work plan for each building will be submitted to USEPA for review and approval within the timeframes specified in Section 5.4. Each mitigation work plan will include the technical specifications, and an operation and maintenance plan for the mitigation system. The mitigation work plans will be prepared in accordance with Sections 9 and 10 (Mitigation Options, and Post-Mitigation Issues) of the USEPA (2010) Region 5 Vapor Intrusion Guidebook.

If it is determined that monitoring is required at any of the VI Study buildings after any of the sampling events, then a VI monitoring work plan for each building will be submitted to USEPA for review and approval within 30 days of receipt of the complete set of preliminary analytical data from the second indoor air sampling event.

Monthly progress reports submitted to USEPA during the investigative work will include the information required for monthly progress reports as described in the Administrative Settlement Agreement and Order on Consent (ASAOC).

6 SCHEDULE

Field work for the Round 1 sampling event will begin no later than the first week of December so that the Round 1 follow-up sampling event (if necessary) would be performed no later than mid-March (i.e., before the beginning of spring which occurs on March 20, 2012); therefore, the follow-up indoor air sampling will be performed in the winter (i.e., one of the two potential worst-case seasons for VI sampling).

Field work for the Round 2 sampling event will begin no later than the first week of July so that the Round 2 follow-up sampling event (if necessary) would be performed no later than mid-September (i.e., before the beginning of fall which occurs on September 22, 2012); therefore, the follow-up indoor air sampling will be performed in the summer (i.e., one of the two potential worst-case seasons for VI sampling).

If either Round 1 or 2 follow-up sampling events are required, then those sampling events will be performed within 30 days of receiving the complete set of the preliminary analytical data from the Round 1 or 2 sampling event.

If, for some reason, access cannot be obtained at a specific building during any sampling event, then the Respondents will immediately notify USEPA in accordance with the provisions in the ASAOC.

Timeframes for submittal of data, sampling event results and assessments, the final report, and any necessary mitigation or monitoring work plans are addressed in Section 5.5.

7 REFERENCES

Conestoga-Rovers & Associates (CRA) – Quality Assurance Project Plan Remedial Investigation/Feasibility Study, September 2008 (CRA, 2008).

Conestoga-Rovers & Associates (CRA) – Streamlined Remedial Investigation and Feasibility Study Report for Operable Unit One (OU1), June 2011 (CRA, 2011).

Interstate Technology Regulatory Council (ITRC) - Vapor Intrusion Pathway: A Practical Guide, January 2007 (ITRC, 2007).

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Office of Solid Waste and Emergency Response (OSWER) - Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance), November 2002 (USEPA, 2002).

Ohio Environmental Protection Agency (Ohio EPA) – Sample Collection and Evaluation of Vapor Intrusion to Indoor Air Guidance Document, May 2010 (Ohio EPA, 2010).

ToxProbe Inc. 2011. Ten Carcinogens in Toronto. Benzo[a]pyrene and other polycyclic aromatic hydrocarbons - Definition of Polycyclic Aromatic Hydrocarbons (PAH) http://www.toronto.ca/health/pdf/cr_appendix_b_pah.pdf. Prepared for Toronto Public Health.

United States Environmental Protection Agency (USEPA) – Guidance for Evaluating Landfill Gas Emissions from Closed or Abandoned Facilities, September 2005 (USEPA, 2005).

United States Environmental Protection Agency (USEPA) – Region 5 - Vapor Intrusion Guidebook, October 2010 (USEPA, 2010).

United States Environmental Protection Agency (USEPA). 2002. *Office of Solid Waste and Emergency Response Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)*. November.

United States Environmental Protection Agency (USEPA). 2011. Indoor Air Regional Screening Levels.

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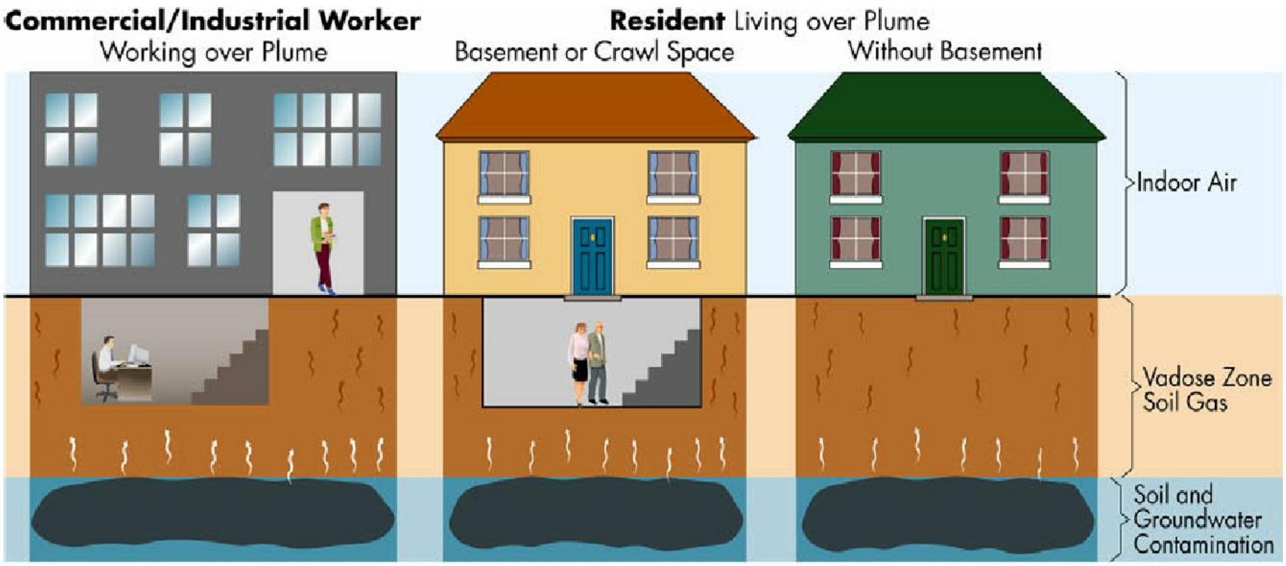


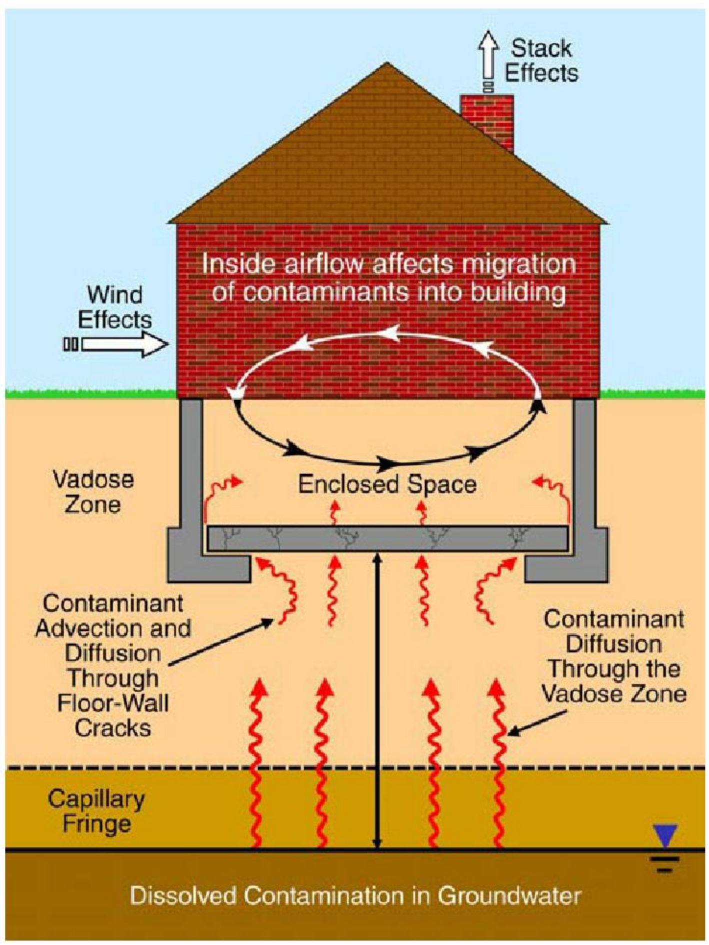


figure 1

CONCEPTUAL SITE MODEL ILLUSTRATING VAPOR INTRUSION
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

CRA

SOURCE:
INTERSTATE TECHNOLOGY & REGULATORY COUNCIL,
VAPOR INTRUSION TEAM. JANUARY 2007.
VAPOR INTRUSION PATHWAY : A PRACTICAL GUIDE

38443-61(015)GN-WA030 AUG 02/2011

Step 1 - Evaluate Potential Explosive Hazard Using Methane Levels

Sub-slab soil vapor (SV) (or crawl space air [CS]) and indoor air (IA) methane levels

Do SV methane levels meet or exceed 100% of the LEL (5% methane by volume)?
OR
Do site-related[1] IA or CS methane levels meet or exceed 25% of the LEL (1.25% methane by volume)?
(OAC 3745-27-12)

Yes

Immediately notify appropriate authorities (e.g., USEPA, Ohio EPA, fire department, health district). Immediately eliminate explosive hazard through mitigation and/or removal.

No

Do SV methane levels meet or exceed 10% of the LEL (0.5% methane by volume)?
OR
Do site-related[1] IA or CS methane levels meet or exceed 1% of the LEL (0.05% methane by volume)?
(USEPA, 2010; Section 8)

Yes

Notify USEPA immediately. Perform rapid response (i.e., mitigation within weeks) to eliminate explosive hazard.

No

If only SV (or CS) and IA methane levels were measured in Round 1 then proceed to Round 2 sampling (SV [or CS] and IA methane sampling).
OR
If VOC samples were collected in Round 1 then proceed to Step 2 below.

Step 2 - Evaluate Potential Human Health Risk Using VOC Levels (USEPA, 2010; Section 8)

Round 1 VOC Sampling Scenarios

1 Sub-slab soil vapor (SV) VOC (including naphthalene) levels

Do SV VOC levels meet or exceed applicable VI screening levels or cumulative risks/hazards corresponding to a target ELCR of $1x10^{-6}$ or HI of 0.1 in indoor air assuming a default attenuation factor of 0.1?

No

Proceed to Round 2 sampling (SV VOC and methane sampling and IA methane sampling)

Yes

Immediately notify USEPA. Collect concurrent IA and SV VOC samples within 30 days of receiving the analytical data to further assess the potential VI human health risk. However, a more rapid response may be required if the building is currently occupied and SV VOC levels exceed 1,000 to 10,000 times the applicable VI screening levels or cumulative risks/hazards based on a target ELCR of $1x10^{-6}$ or HI of 0.1 in indoor air

2 Crawl space air (CS) VOC levels

No

Do site-related[1] CS VOC levels meet or exceed applicable VI screening levels or cumulative risks/hazards corresponding to a target ELCR of $1x10^{-5}$ or HI of 1 in indoor air assuming a default attenuation factor of 1?

No

Proceed to Round 2 sampling (CS VOC and methane sampling and IA methane sampling)

Yes

Immediately notify USEPA. Collect concurrent IA and CS VOC samples within 30 days of receiving the analytical data to further assess the potential VI human health risk.

3 Sub-slab soil vapor (SV) and indoor air (IA) VOC levels

Do site-related[1] IA VOC levels due to VI meet or exceed applicable VI screening levels or cumulative risks/hazards based on a target ELCR of $1x10^{-4}$ or HI of 10?

Yes

Immediately notify USEPA. Submit a work plan (including operation and maintenance) within 15 days of receiving the analytical data to perform rapid mitigation (i.e., within a few weeks) to address the human health risk.

No

Do site-related[1] IA VOC levels due to VI meet or exceed applicable VI screening levels or cumulative risks/hazards based on a target ELCR of $1x10^{-5}$ or HI of 10?

Yes

Immediately notify USEPA. Submit a work plan (including operation and maintenance) within 30 days of receiving the analytical data to perform mitigation to address the human health risk.

No

Proceed to Round 2 sampling (SV and IA VOC and methane sampling)

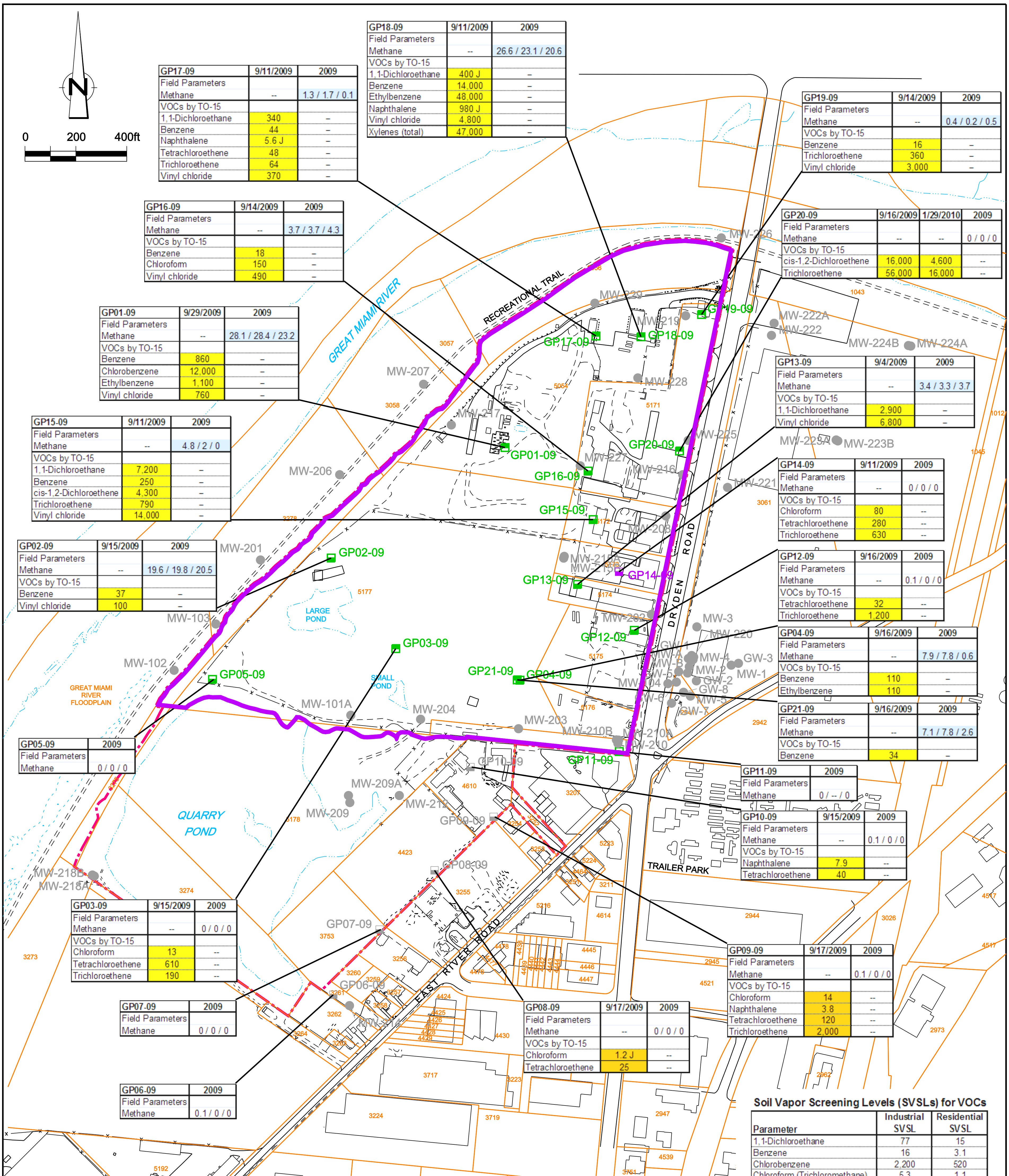
Notes:

This flow chart depicts the decsion making process that will be used to evaluate the Round 1 sampling data and the potential next steps in the VI evaluation for each of the VI Study buildings. Additional information on the decision rules is provided in Section 5.4. The screening levels referenced in this flow chart are detailed in Section 5.2 and are provided in Tables 5 - 7. Sampling data collected in any follow-up sampling events and in the Round 2 sampling event will be evaluated using the decision rules provided in Section 5.4 (i.e., decision flow charts for follow-on sampling events and Round 2 are not included in this work plan).

[1] - Multiple lines of evidence will be considered when determining if the measured crawl space or indoor air concentrations are site-related and due to VI. Example lines of evidence include, but are not limited to (1) indoor-to-outdoor and/or indoor-to-sub-slab VOC ratios; (2) building characteristics; (3) VOC ratios within and between samples; and (4) site geology/history. Refer to the USEPA (2010) Region 5 VI Guidebook for additional discussion.

CS - crawl space
ELCR - excess lifetime cancer risk
HI - hazard index
IA - indoor air
LEL - lower explosive limit
OAC - Ohio Administrative Code
Ohio EPA - Ohio Environmental Protection Agency
SV - soild vapor
USEPA - United States Environmental Protection Agency
VI - vapor intrusion
VOC - volatile organic compound

FIGURE 2
Vapor Intrusion Sampling Decision Flow Chart for Round 1
South Dayton Dump and Landfill Site
Moraine, Ohio



GP18-09	9/11/2009	2009
Field Parameters		
Methane	--	26.6 / 23.1 / 20.6
VOCs by TO-15		
1,1-Dichloroethane	400 J	--
Benzene	14,000	--
Ethylbenzene	48,000	--
Naphthalene	980 J	--
Vinyl chloride	4,800	--
Xylenes (total)	47,000	--

GP17-09	9/11/2009	2009
Field Parameters		
Methane	--	1.3 / 1.7 / 0.1
VOCs by TO-15		
1,1-Dichloroethane	340	--
Benzene	44	--
Naphthalene	5.6 J	--
Tetrachloroethene	48	--
Trichloroethene	64	--
Vinyl chloride	370	--

GP19-09	9/14/2009	2009
Field Parameters		
Methane	--	0.4 / 0.2 / 0.5
VOCs by TO-15		
Benzene	16	--
Trichloroethene	360	--
Vinyl chloride	3,000	--

GP16-09	9/14/2009	2009
Field Parameters		
Methane	--	3.7 / 3.7 / 4.3
VOCs by TO-15		
Benzene	18	--
Chloroform	150	--
Vinyl chloride	490	--

GP20-09	9/16/2009	1/29/2010	2009
Field Parameters			
Methane	--	--	0 / 0 / 0
VOCs by TO-15			
cis-1,2-Dichloroethene	16,000	4,600	--
Trichloroethene	56,000	16,000	--

GP01-09	9/29/2009	2009
Field Parameters		
Methane	--	28.1 / 28.4 / 23.2
VOCs by TO-15		
Benzene	860	--
Chlorobenzene	12,000	--
Ethylbenzene	1,100	--
Vinyl chloride	760	--

GP13-09	9/4/2009	2009
Field Parameters		
Methane	--	3.4 / 3.3 / 3.7
VOCs by TO-15		
1,1-Dichloroethane	2,900	--
Vinyl chloride	6,800	--

GP15-09	9/11/2009	2009
Field Parameters		
Methane	--	4.8 / 2 / 0
VOCs by TO-15		
1,1-Dichloroethane	7,200	--
Benzene	250	--
cis-1,2-Dichloroethene	4,300	--
Trichloroethene	790	--
Vinyl chloride	14,000	--

GP14-09	9/11/2009	2009
Field Parameters		
Methane	--	0 / 0 / 0
VOCs by TO-15		
Chloroform	80	--
Tetrachloroethene	280	--
Trichloroethene	630	--

GP02-09	9/15/2009	2009
Field Parameters		
Methane	--	19.6 / 19.8 / 20.5
VOCs by TO-15		
Benzene	37	--
Vinyl chloride	100	--

GP12-09	9/16/2009	2009
Field Parameters		
Methane	--	0.1 / 0 / 0
VOCs by TO-15		
Tetrachloroethene	32	--
Trichloroethene	1,200	--

GP04-09	9/16/2009	2009
Field Parameters		
Methane	--	7.9 / 7.8 / 0.6
VOCs by TO-15		
Benzene	110	--
Ethylbenzene	110	--

GP21-09	9/16/2009	2009
Field Parameters		
Methane	--	7.1 / 7.8 / 2.6
VOCs by TO-15		
Benzene	34	--

GP05-09	2009
Field Parameters	
Methane	0 / 0 / 0

GP11-09	2009
Field Parameters	
Methane	0 / -- / 0

GP10-09	9/15/2009	2009
Field Parameters		
Methane	--	0.1 / 0 / 0
VOCs by TO-15		
Naphthalene	7.9	--
Tetrachloroethene	40	--

GP03-09	9/15/2009	2009
Field Parameters		
Methane	--	0 / 0 / 0
VOCs by TO-15		
Chloroform	13	--
Tetrachloroethene	610	--
Trichloroethene	190	--

GP09-09	9/17/2009	2009
Field Parameters		
Methane	--	0.1 / 0 / 0
VOCs by TO-15		
Chloroform	14	--
Naphthalene	3.8	--
Tetrachloroethene	120	--
Trichloroethene	2,000	--

GP07-09	2009
Field Parameters	
Methane	0 / 0 / 0

GP08-09	9/17/2009	2009
Field Parameters		
Methane	--	0 / 0 / 0
VOCs by TO-15		
Chloroform	1.2 J	--
Tetrachloroethene	25	--

GP06-09	2009
Field Parameters	
Methane	0.1 / 0 / 0

Soil Vapor Screening Levels (SVSLs) for VOCs

Parameter	Industrial SVSL	Residential SVSL
1,1-Dichloroethane	77	15
Benzene	16	3.1
Chlorobenzene	2,200	520
Chloroform (Trichloromethane)	5.3	1.1
cis-1,2-Dichloroethene[a]	2,600	630
Ethylbenzene	49	9.7
Naphthalene	3.6	0.72
Tetrachloroethene	21	4.1
Trichloroethene[b]	61	12
Vinyl chloride	28	1.6
Xylenes (total)	4,400	1,000

NOTE:
1. The SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial and Residential Air.
2. The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
3. a = An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
4. b = The IRIS toxicity value for TCE was updated in September 2011. The SVSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.

SVSLs for Methane

UEL (%)	LEL (%)	10% LEL (%)
15	5	0.5

NOTE:
1. UEL = UPPER EXPLOSIVE LEVEL
2. LEL = LOWER EXPLOSIVE LEVEL

LEGEND

APPROXIMATE SITE BOUNDARY
EDGE OF WATER
PARCEL BOUNDARY
MW-206 MONITORING WELL LOCATION
GP01-09 LANDFILL GAS PROBE
PRESUMPTIVE REMEDY AREA

GP05-09	2009
Field Parameters	
Methane	0/0/0

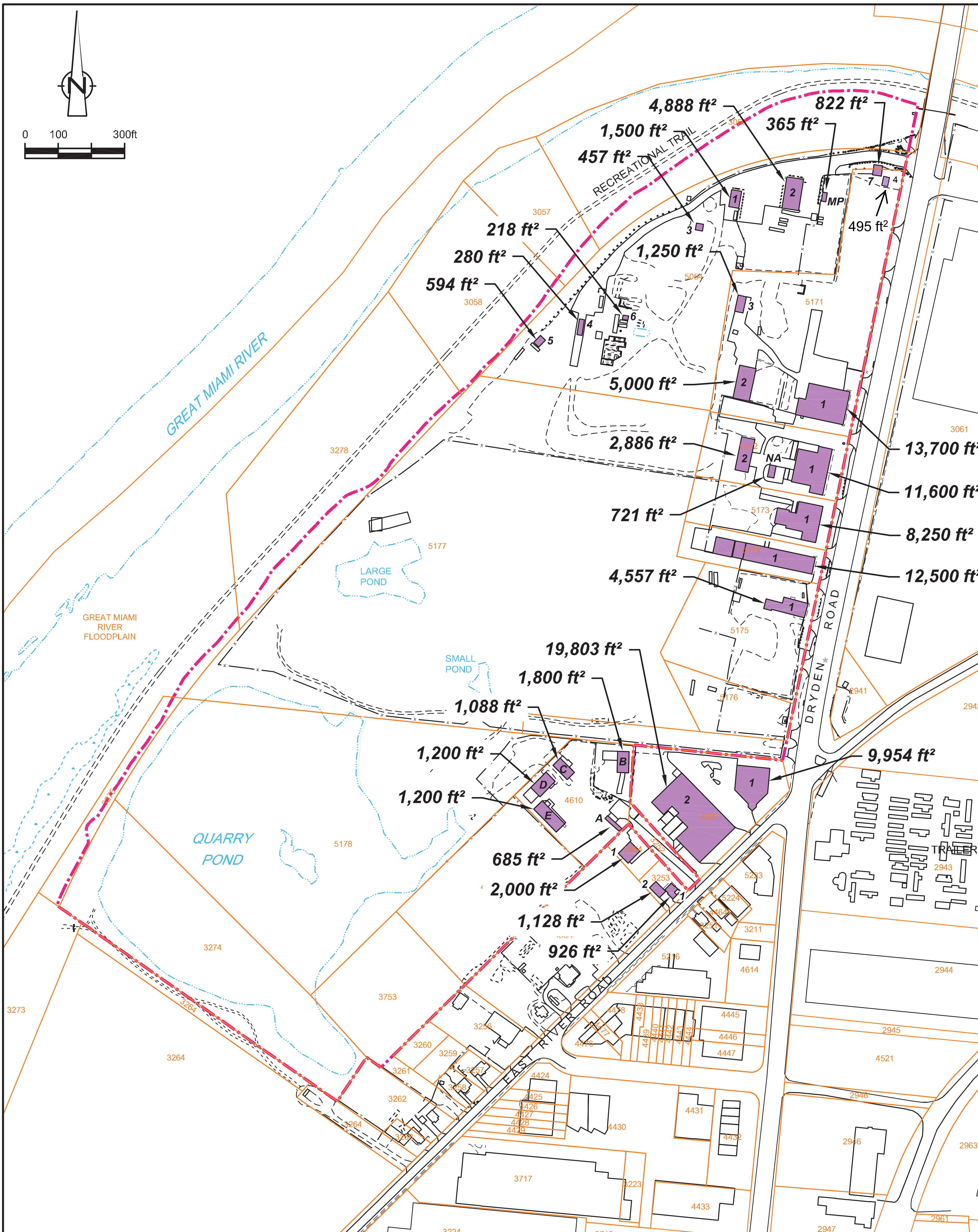
SAMPLE IDENTIFICATION
SAMPLE DATE
CONCENTRATION-METHANE (%) AND VOCs ($\mu g/m^3$)
PARAMETER
J ESTIMATED
19.6/19.8/20.5 METHANE READINGS MEASURED ON SEPT. 18, 2009 / OCT. 14, 2009 / DEC. 9-10, 2009
EXCEEDS INDUSTRIAL SVSL
EXCEEDS RESIDENTIAL SVSL
EXCEEDS METHANE SVSL

NOTE:
1. METHANE CONCENTRATION SHOWN IN UNITS OF %.
2. ONLY GP06-09 TO GP09-09 SOIL VAPOR VOC RESULTS WERE COMPARED TO RESIDENTIAL SVSLS BECAUSE THOSE PROBES ARE LOCATED ON RESIDENTIAL PARCELS.

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

figure 3

2009 AND 2010 SOIL VAPOR SAMPLING RESULTS THAT EXCEED USEPA SCREENING LEVELS
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio



LEGEND

APPROXIMATE SITE BOUNDARY
EDGE OF WATER
PARCEL BOUNDARY
SUB SLAB SAMPLING LOCATION
NA NOT ACCESSIBLE AT TIME OF BUILDING SURVEY

figure 4

SUB SLAB BUILDING DESIGNATIONS
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

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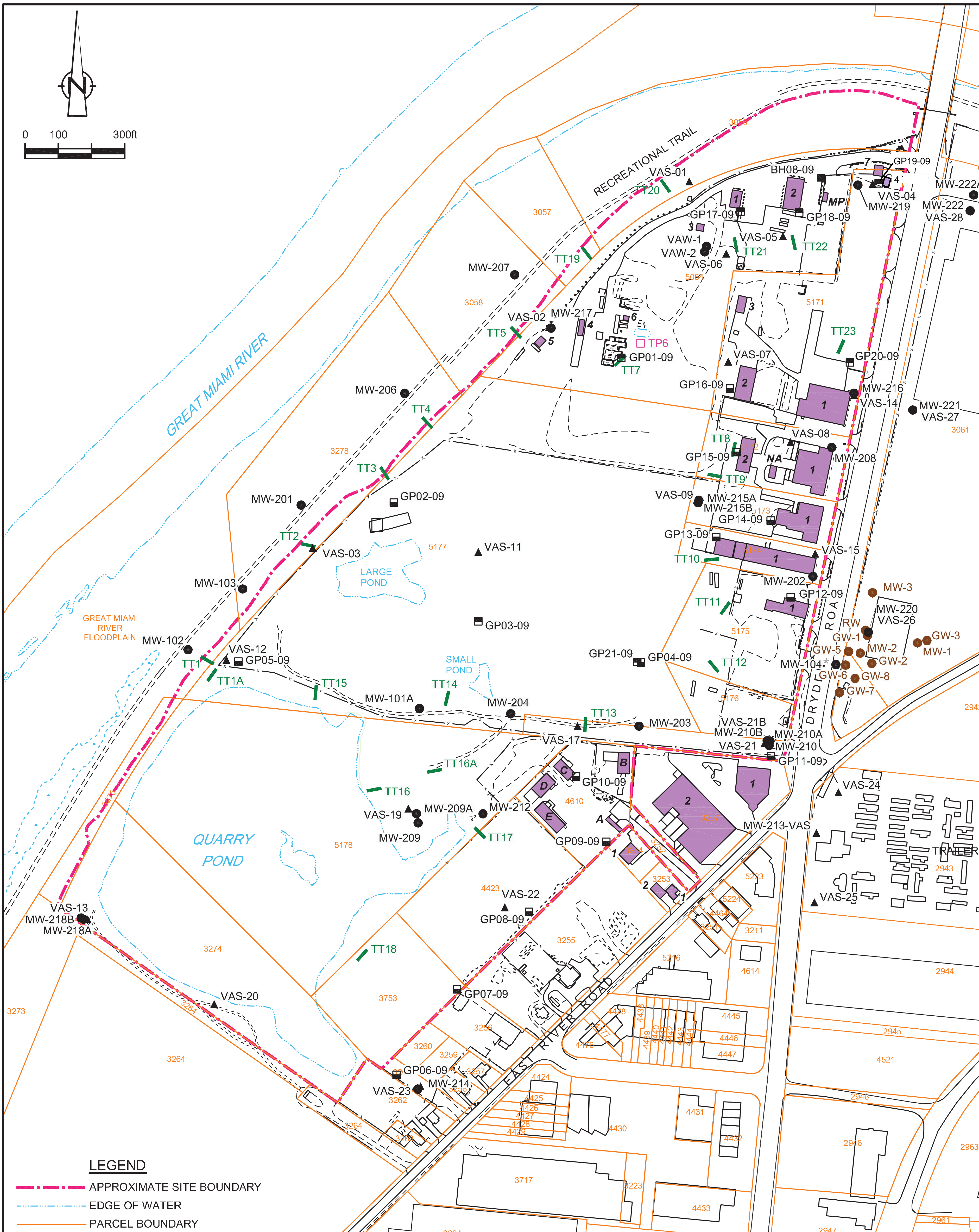


LEGEND

- APPROXIMATE SITE BOUNDARY
- EDGE OF WATER
- PARCEL BOUNDARY
- SUB SLAB SAMPLING LOCATION
- NA — NOT ACCESSIBLE AT TIME OF BUILDING SURVEY
- MW-202 — MONITORING WELL LOCATION
- MW-1 — HISTORIC DP&L MONITORING WELL LOCATION
- BH01-09 — SOIL BORING LOCATION
- * — APPROXIMATE LOCATION
- VAS01 — VAS SAMPLING LOCATION
- GP21-09 — SHALLOW LANDFILL GAS PROBE
- GP04-09 — DEEP LANDFILL GAS PROBE
- TP1 — TEST PIT LOCATION
- TT1 — TEST TRENCH LOCATION

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

figure 5
SOIL, GROUNDWATER, AND SOIL GAS INVESTIGATIVE LOCATIONS
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

38443-61(015)GN-WA003 AUG 02/2011

0 20 50ft

LEGEND

- APPROXIMATE SITE BOUNDARY
- EDGE OF WATER
- PARCEL BOUNDARY
- VAPOR INTRUSION STUDY BUILDING LOCATION
- MW-202 MONITORING WELL LOCATION
- BH01-09 SOIL BORING LOCATION
- VAS01 VAS SAMPLING LOCATION
- GP21-09, GP04-09 SOIL VAPOR PROBE LOCATION
- TP1 TEST PIT LOCATION
- TT1 TEST TRENCH LOCATION
- PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
- PROPOSED INDOOR AIR SAMPLE LOCATION
- PROPOSED CRAWL SPACE AIR SAMPLE LOCATION
- CONTINGENCY INDOOR AIR SAMPLE LOCATION

GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

SAMPLE DATE, SAMPLE DEPTH, SAMPLE UNITS, CONCENTRATION VALUE, COMPOUND, SAMPLE ID, EXCEEDANCES

SOIL VAPOR SCREENING LEVELS (ug/m3)	
CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTES:

Methane concentrations shown in units of %.

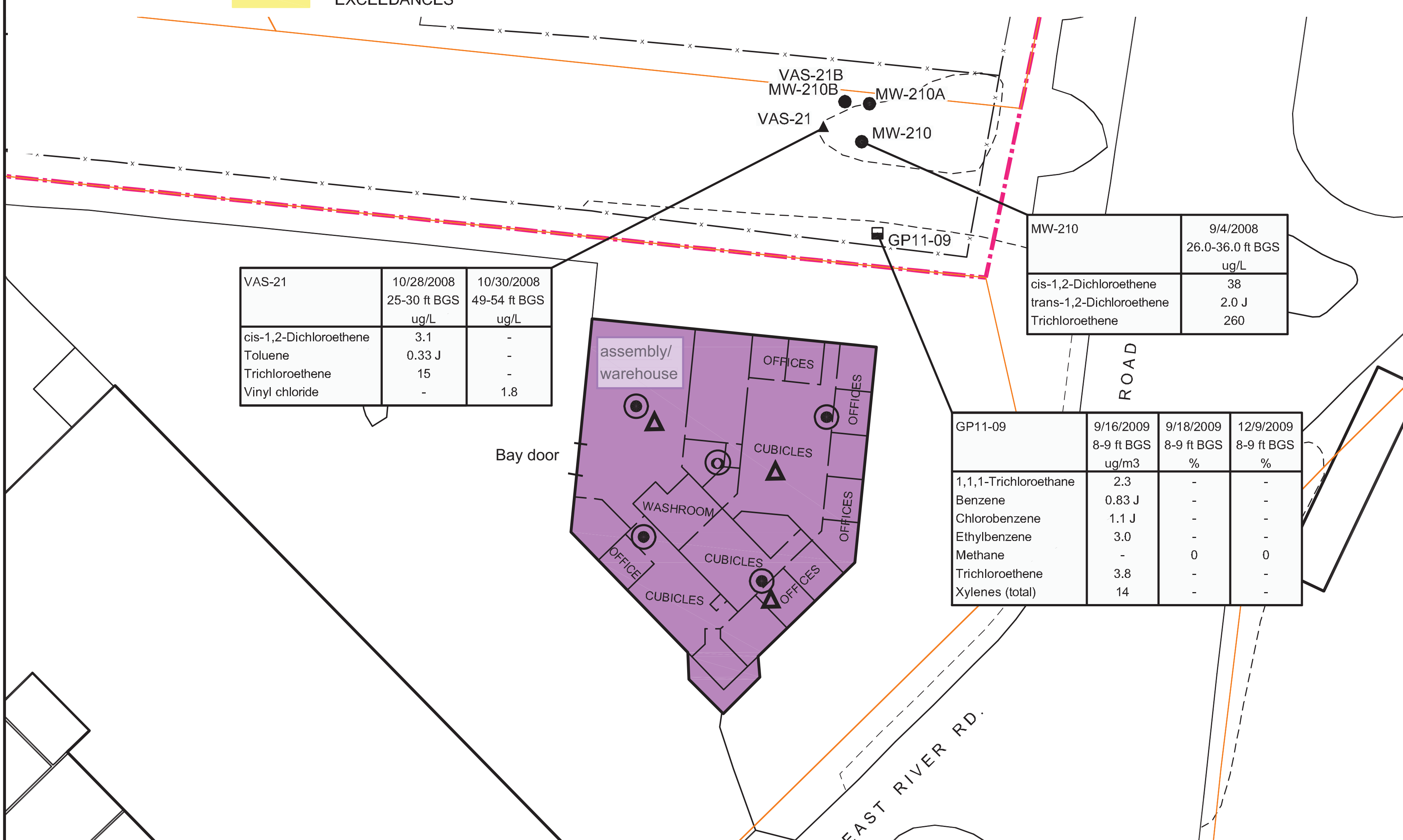
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit

The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.

The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.

An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.

The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.



VAS-21	10/28/2008 25-30 ft BGS ug/L	10/30/2008 49-54 ft BGS ug/L
cis-1,2-Dichloroethene	3.1	-
Toluene	0.33 J	-
Trichloroethene	15	-
Vinyl chloride	-	1.8

MW-210	9/4/2008 26.0-36.0 ft BGS ug/L
cis-1,2-Dichloroethene	38
trans-1,2-Dichloroethene	2.0 J
Trichloroethene	260

GP11-09	9/16/2009 8-9 ft BGS ug/m3	9/18/2009 8-9 ft BGS %	12/9/2009 8-9 ft BGS %
1,1,1-Trichloroethane	2.3	-	-
Benzene	0.83 J	-	-
Chlorobenzene	1.1 J	-	-
Ethylbenzene	3.0	-	-
Methane	-	0	0
Trichloroethene	3.8	-	-
Xylenes (total)	14	-	-

PROFILE VIEW

N.T.S.

Building Characteristics:
Single-story commercial/industrial-use building. Primarily office space with some assembly/warehouse space. Constructed in 2004 over historic location of gas station and junk yard. Footprint is 9.954 sq. ft. Slab-on-grade concrete building, unsealed joints in assembly/warehouse room. Wall-to-wall carpeting in the office space. Insulated and air tight building, with weather seals in good condition. Heating provided by forced air natural gas roof-top units. Central A/C provided by roof-top units. Exterior openings - vents, utility pipe penetrations, inoperable windows, man doors, roll-up door. Occupied weekdays from 8 AM to 5 PM by approximately 15 adult workers.

figure 6

PARCEL 3207 - GLOBE EQUIPMENT BUILDING 1
2153 DRYDEN ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA005 AUG 08/2011

LEGEND

0 20 50ft

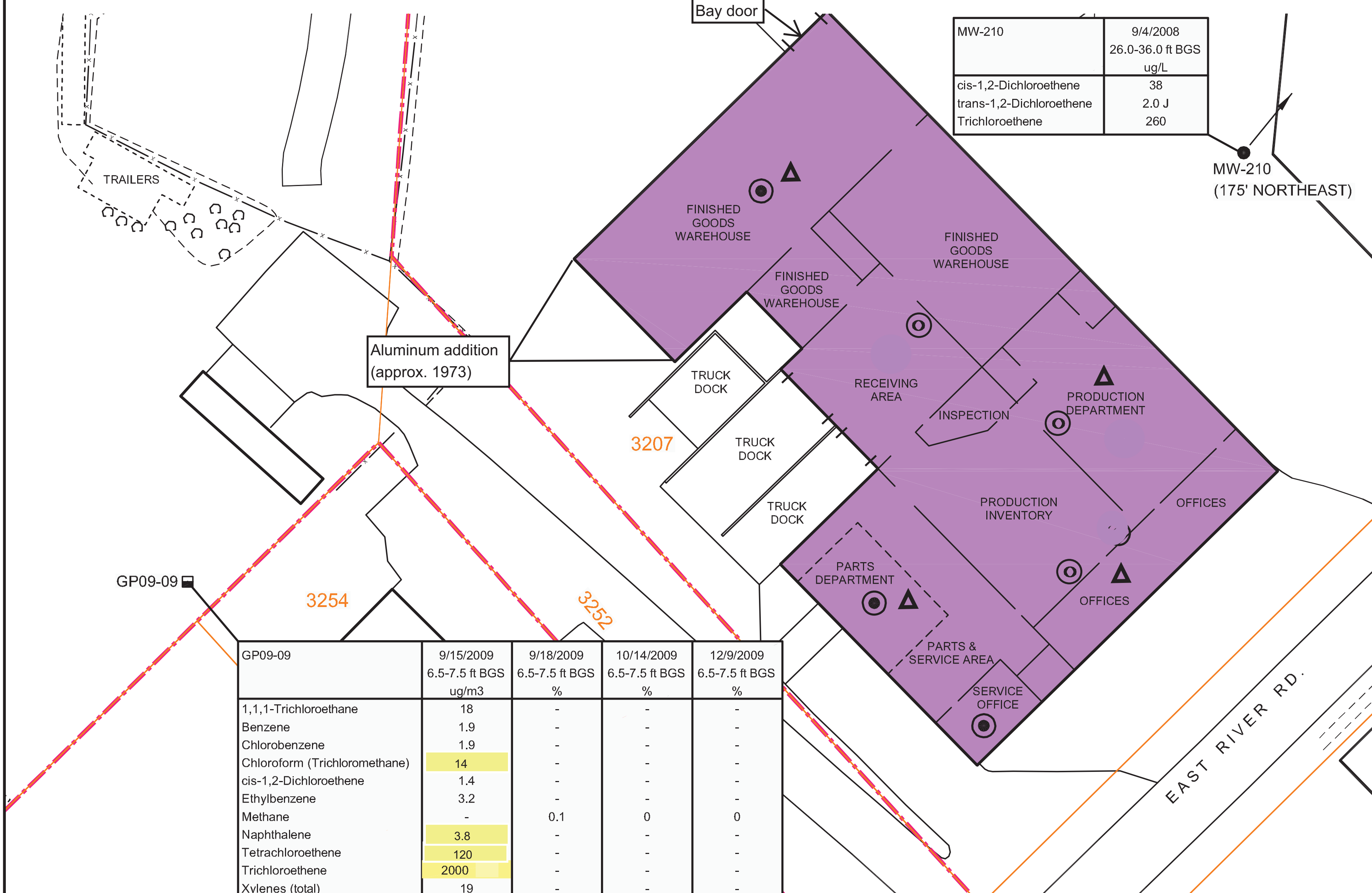
- APPROXIMATE SITE BOUNDARY
- EDGE OF WATER
- PARCEL BOUNDARY
- VAPOR INTRUSION STUDY BUILDING LOCATION
- MW-202 MONITORING WELL LOCATION
- BH01-09 SOIL BORING LOCATION
- VAS01 VAS SAMPLING LOCATION
- GP21-09, GP04-09 SOIL VAPOR PROBE LOCATION
- TP1 TEST PIT LOCATION
- TT1 TEST TRENCH LOCATION
- PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
- PROPOSED INDOOR AIR SAMPLE LOCATION
- PROPOSED CRAWL SPACE AIR SAMPLE LOCATION
- CONTINGENCY INDOOR AIR SAMPLE LOCATION

GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

SAMPLE DATE
SAMPLE DEPTH
SAMPLE UNITS
CONCENTRATION VALUE
COMPOUND
SAMPLE ID
EXCEEDANCES

SOIL VAPOR SCREENING LEVELS (ug/m3)	
CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

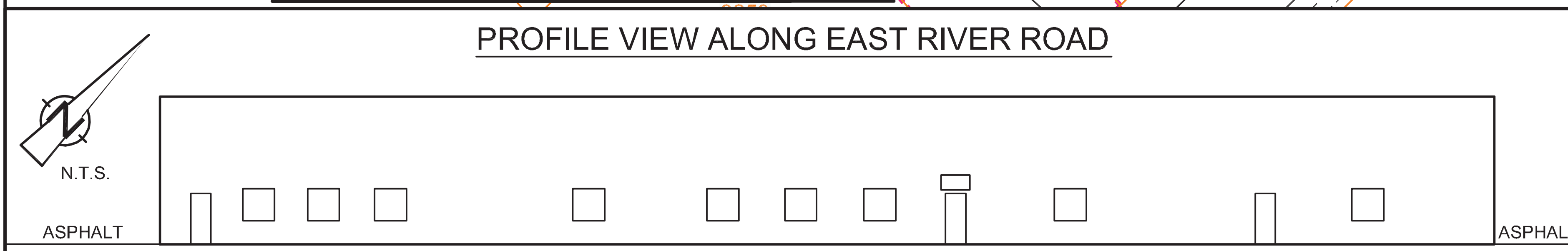
NOTES:
Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.



MW-210	9/4/2008 26.0-36.0 ft BGS ug/L
cis-1,2-Dichloroethene	38
trans-1,2-Dichloroethene	2.0 J
Trichloroethene	260

GP09-09	9/15/2009 6.5-7.5 ft BGS ug/m3	9/18/2009 6.5-7.5 ft BGS %	10/14/2009 6.5-7.5 ft BGS %	12/9/2009 6.5-7.5 ft BGS %
1,1,1-Trichloroethane	18	-	-	-
Benzene	1.9	-	-	-
Chlorobenzene	1.9	-	-	-
Chloroform (Trichloromethane)	14	-	-	-
cis-1,2-Dichloroethene	1.4	-	-	-
Ethylbenzene	3.2	-	-	-
Methane	-	0.1	0	0
Naphthalene	3.8	-	-	-
Tetrachloroethene	120	-	-	-
Trichloroethene	2000	-	-	-
Xylenes (total)	19	-	-	-

PROFILE VIEW ALONG EAST RIVER ROAD



Building Characteristics:
Single-story industrial-use slab-on-grade building. Primarily assembly/warehouse space with some office space. Main portion of the building constructed prior to 1968 of concrete block. Northern addition was constructed prior to 1973 of steel frame and aluminum siding. Total footprint is 19,803 sq. ft. Building is 16 ft high, office space has 8 ft drop ceilings. Majority of the building has bare concrete floors, except office space is carpeted. Some large cracks in the slab are visible, some cracks are sealed. Building is not insulated, average air tightness with no weather seals present. Heating provided by forced air natural gas furnace. Central A/C provided by rooftop units. Exterior openings - vents, fans, utility pipe penetrations, windows, bay doors and man doors. Windows and bay doors are open in good weather. Occupied weekdays from 7 AM to 5 PM by approximately 25 adult workers.

figure 7

PARCEL 3207 - GLOBE EQUIPMENT BUILDING 2
2215 AND 2219 EAST RIVER ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA004 AUG 08/2011

LEGEND

- APPROXIMATE SITE BOUNDARY
- EDGE OF WATER
- PARCEL BOUNDARY
- VAPOR INTRUSION STUDY BUILDING LOCATION
- MW-202 — MONITORING WELL LOCATION
- BH01-09 — SOIL BORING LOCATION
- VAS01 — VAS SAMPLING LOCATION
- GP21-09, GP04-09 — SOIL VAPOR PROBE LOCATION
- TP1 — TEST PIT LOCATION
- TT1 — TEST TRENCH LOCATION
- PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
- PROPOSED INDOOR AIR SAMPLE LOCATION
- PROPOSED CRAWL SPACE AIR SAMPLE LOCATION

0 20 50ft

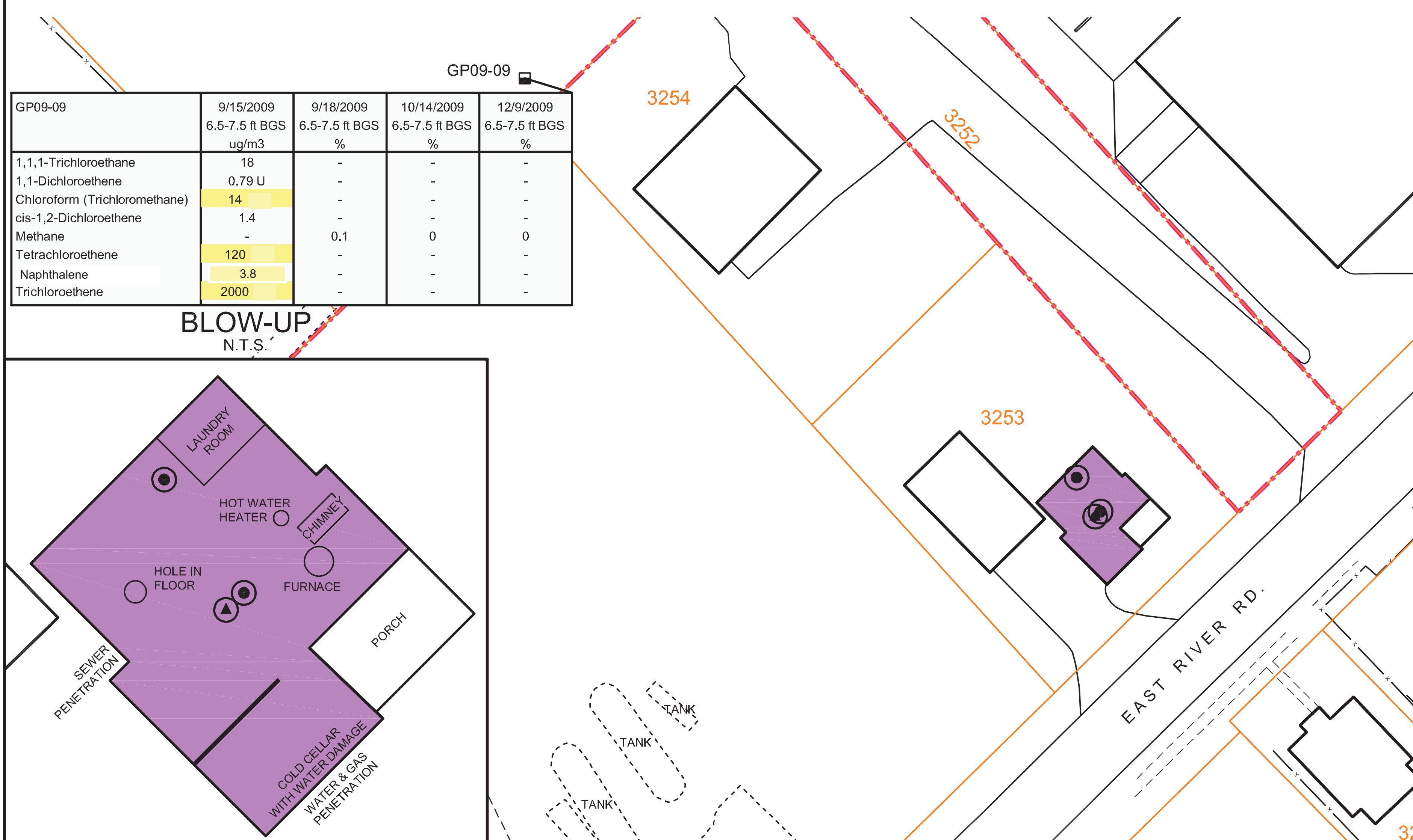
GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

SAMPLE ID
SAMPLE DATE
SAMPLE DEPTH
SAMPLE UNITS
CONCENTRATION VALUE
COMPOUND
EXCEEDANCES

SOIL VAPOR SCREENING LEVELS (ug/m3)

CHEMICAL NAME	RESIDENTIAL SVSLs
1,1,1-Trichloroethane	52000
1,1-Dichloroethene	2100
Chloroform (Trichloromethane)	1.1
cis-1,2-Dichloroethene	630
Tetrachloroethene	4.1
Naphthalene	0.72
Trichloroethene	12
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTES:
Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.



GP09-09	9/15/2009 6.5-7.5 ft BGS ug/m3	9/18/2009 6.5-7.5 ft BGS %	10/14/2009 6.5-7.5 ft BGS %	12/9/2009 6.5-7.5 ft BGS %
1,1,1-Trichloroethane	18	-	-	-
1,1-Dichloroethene	0.79 U	-	-	-
Chloroform (Trichloromethane)	14	-	-	-
cis-1,2-Dichloroethene	1.4	-	-	-
Methane	-	0.1	0	0
Tetrachloroethene	120	-	-	-
Naphthalene	3.8	-	-	-
Trichloroethene	2000	-	-	-

PROFILE VIEW

N.T.S.

Building Characteristics:
Two-story, residential, single family house constructed in 1800s with stone foundation and vinyl siding. Unfinished basement, 926 ft sq. with concrete floor containing an approximately 2-ft diameter hole with pipe for condensate. Unsealed, stone and mortar foundation walls in poor condition. Average air tightness, weather seals in fair condition. Heating provided by forced air natural gas furnace. Central A/C and fireplace present. Exterior openings in the basement - utility pipe penetrations, 2 windows and man doors. Constant occupancy by one adult.

figure 8

PARCEL 3253, BUILDING 1
2233 FRONT EAST RIVER ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA006 AUG 08/2011

LEGEND

- APPROXIMATE SITE BOUNDARY
- EDGE OF WATER
- PARCEL BOUNDARY
- VAPOR INTRUSION STUDY BUILDING LOCATION
- MW-202 — MONITORING WELL LOCATION
- BH01-09 — SOIL BORING LOCATION
- VAS01 — VAS SAMPLING LOCATION
- GP21-09, GP04-09 — SOIL VAPOR PROBE LOCATION
- TP1 — TEST PIT LOCATION
- TT1 — TEST TRENCH LOCATION
- PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
- PROPOSED INDOOR AIR SAMPLE LOCATION
- PROPOSED CRAWL SPACE AIR SAMPLE LOCATION

0 20 50ft

GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

SAMPLE ID
SAMPLE DATE
SAMPLE DEPTH
SAMPLE UNITS
CONCENTRATION VALUE
COMPOUND
EXCEEDANCES

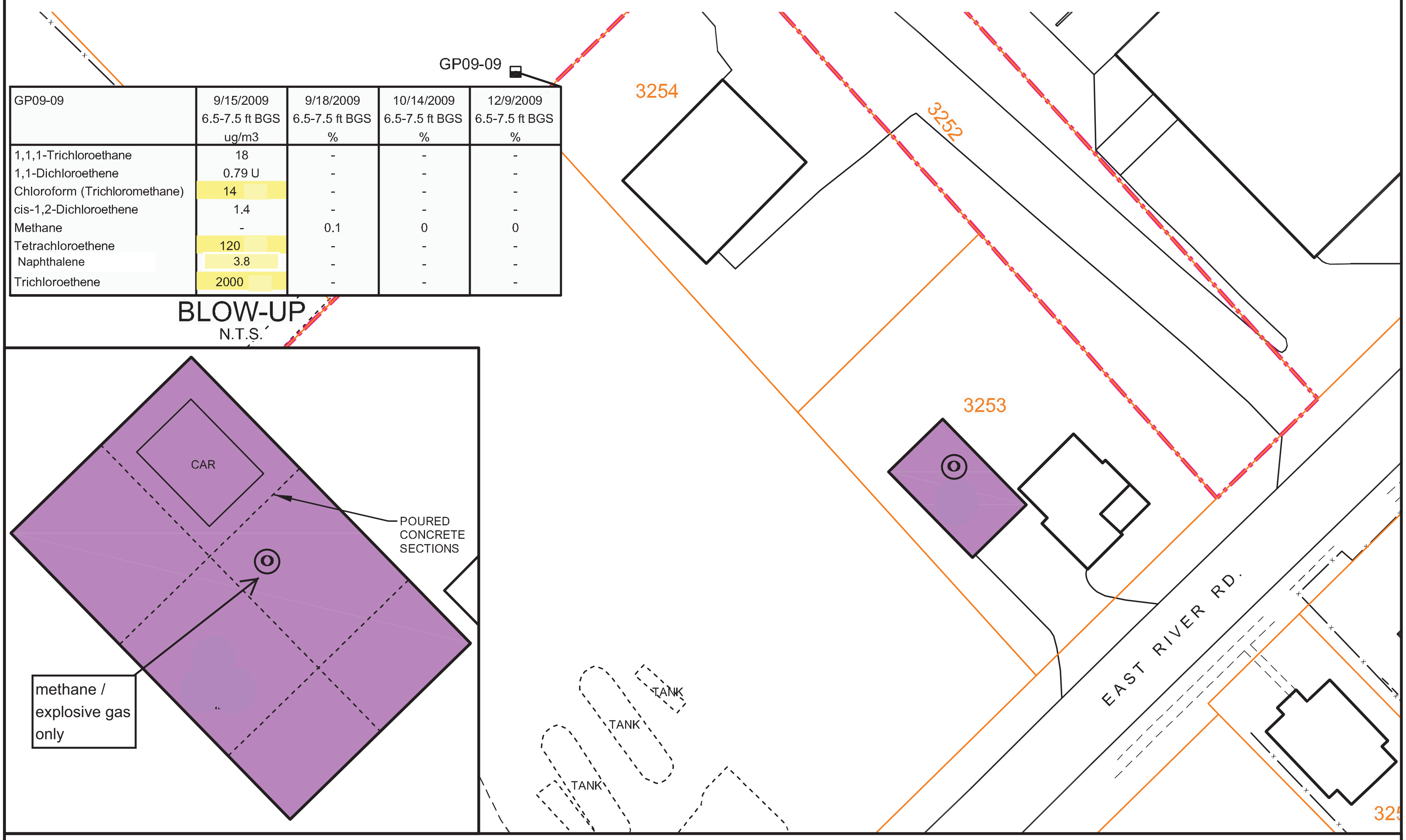
SOIL VAPOR SCREENING LEVELS (ug/m3)	
CHEMICAL NAME	RESIDENTIAL SVSLs
1,1,1-Trichloroethane	52000
1,1-Dichloroethene	2100
Chloroform (Trichloromethane)	1.1
cis-1,2-Dichloroethene	630
Tetrachloroethene	4.1
Naphthalene	0.72
Trichloroethene	12
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTES:

Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.

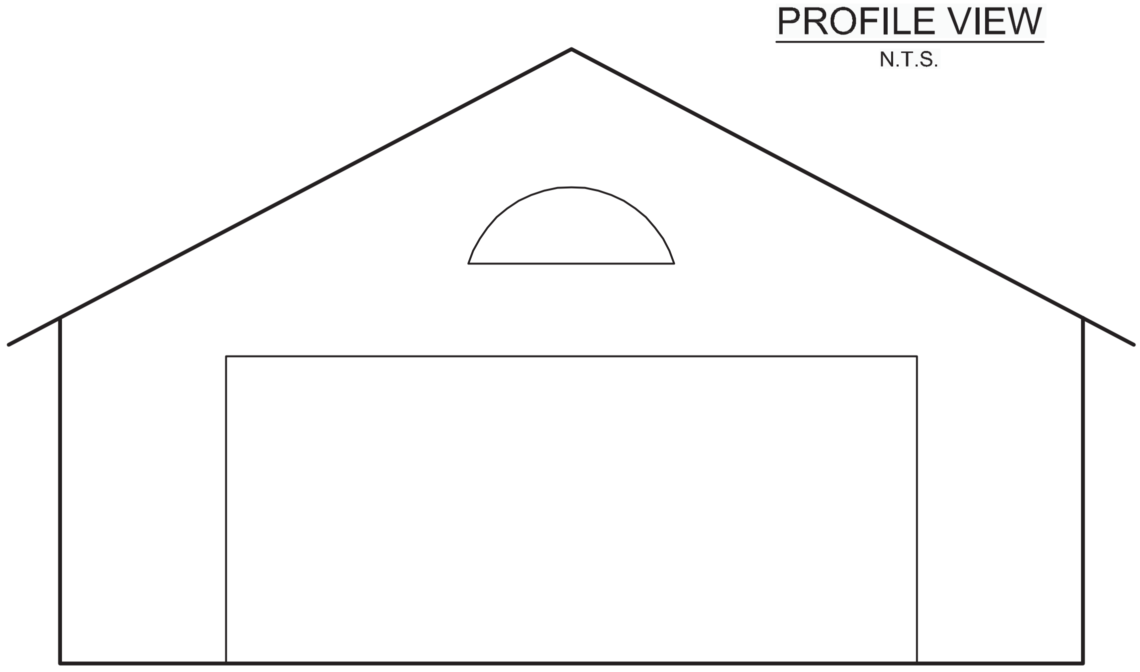
GP09-09

GP09-09	9/15/2009 6.5-7.5 ft BGS ug/m3	9/18/2009 6.5-7.5 ft BGS %	10/14/2009 6.5-7.5 ft BGS %	12/9/2009 6.5-7.5 ft BGS %
1,1,1-Trichloroethane	18	-	-	-
1,1-Dichloroethene	0.79 U	-	-	-
Chloroform (Trichloromethane)	14	-	-	-
cis-1,2-Dichloroethene	1.4	-	-	-
Methane	-	0.1	0	0
Tetrachloroethene	120	-	-	-
Naphthalene	3.8	-	-	-
Trichloroethene	2000	-	-	-



PROFILE VIEW

N.T.S.



Building Characteristics:
Single-story, 2-car garage constructed early 1990s. 1,128 sq. ft. slab-on-grade, vinyl-sided, building with poured concrete floor composed of six separate poured sections with unsealed joints. Unsealed, poured concrete four inch-high foundation walls in good condition. Average air tightness; weather seals in good condition. No HVAC systems present. Exterior openings - 2 windows, overhead and personnel doors. Grass and concrete exterior ground cover.
No regular occupancy - storage only

figure 9

PARCEL 3253, BUILDING 2
2233 FRONT EAST RIVER ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA007 AUG 08/2011

LEGEND

- APPROXIMATE SITE BOUNDARY
- EDGE OF WATER
- PARCEL BOUNDARY
- VAPOR INTRUSION STUDY BUILDING LOCATION
- MW-202 — MONITORING WELL LOCATION
- BH01-09 — SOIL BORING LOCATION
- VAS01 — VAS SAMPLING LOCATION
- GP21-09, GP04-09 — SOIL VAPOR PROBE LOCATION
- TP1 — TEST PIT LOCATION
- TT1 — TEST TRENCH LOCATION
- PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
- PROPOSED INDOOR AIR SAMPLE LOCATION
- PROPOSED CRAWL SPACE AIR SAMPLE LOCATION
- CONTINGENCY INDOOR AIR SAMPLE LOCATION

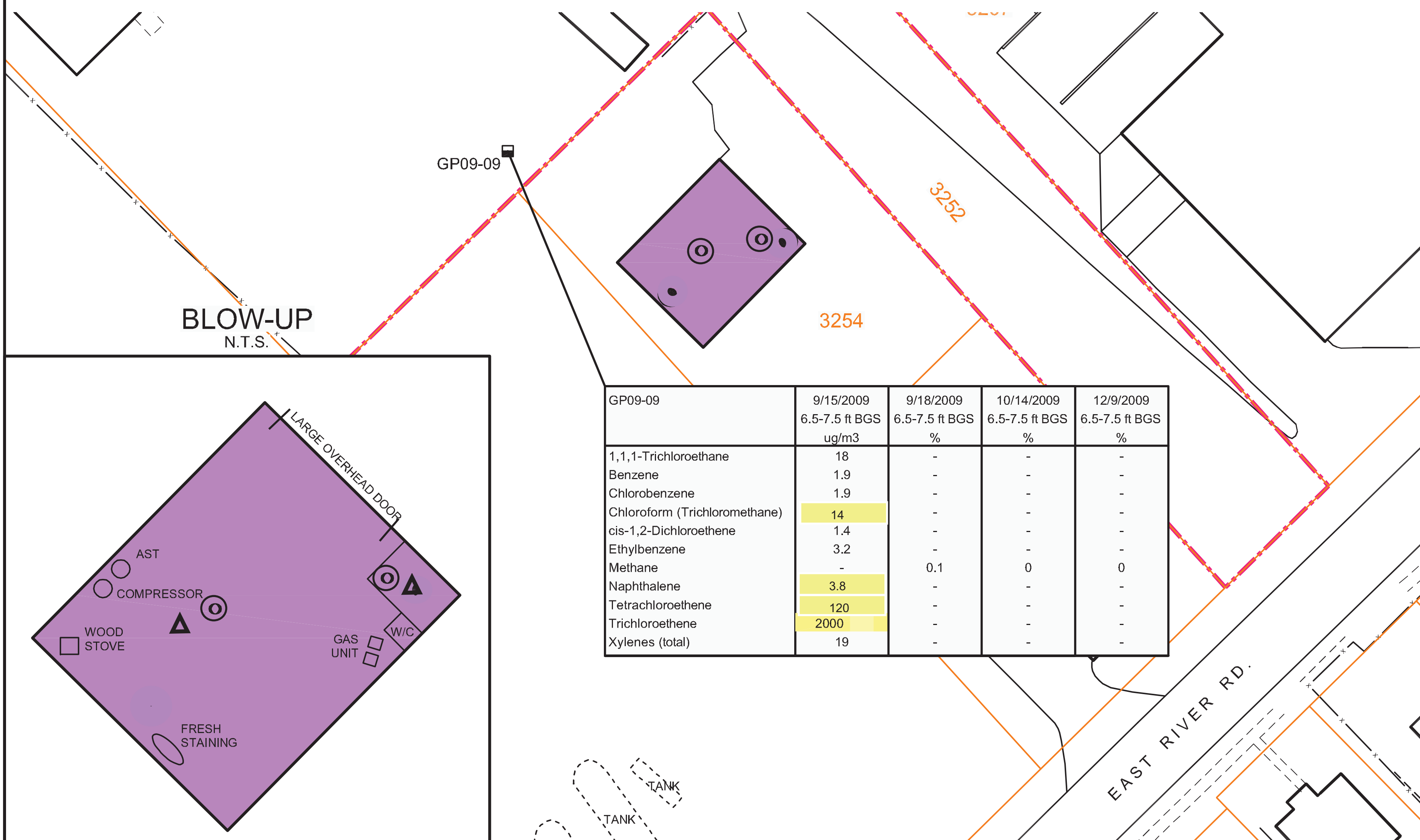
GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

SAMPLE DATE; SAMPLE DEPTH; SAMPLE UNITS; CONCENTRATION VALUE; COMPOUND; SAMPLE ID; EXCEEDANCES

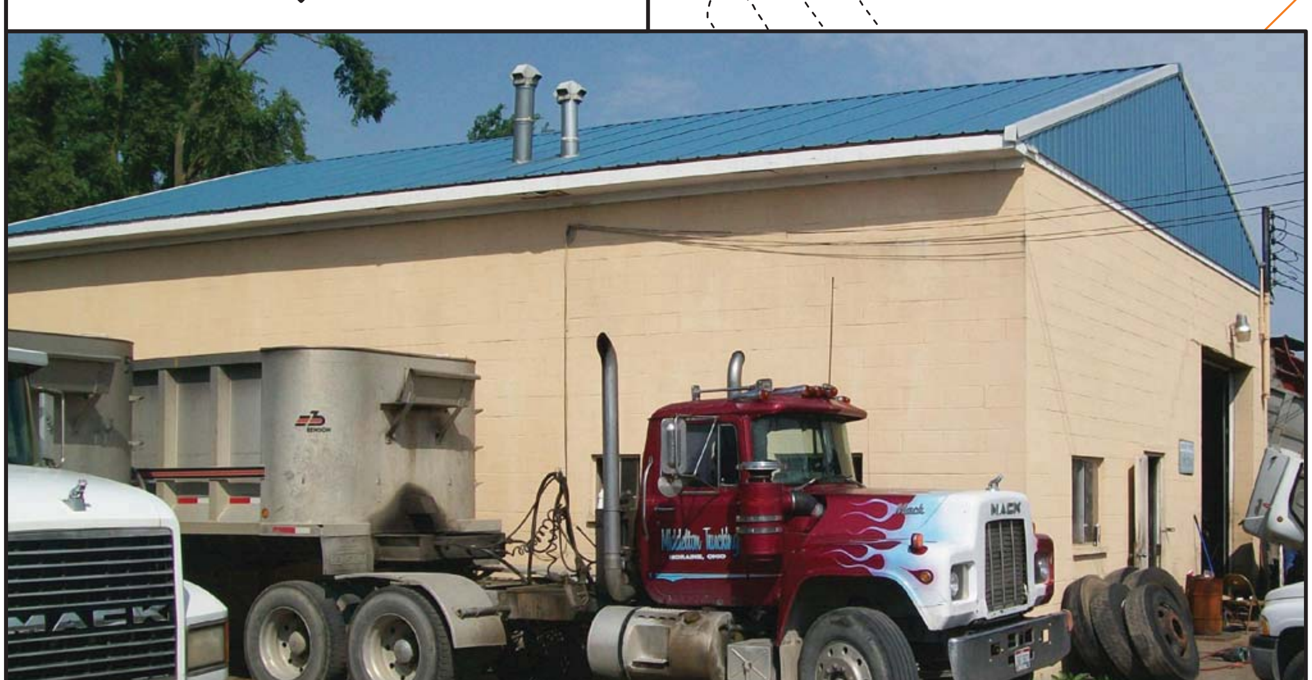
0 20 50ft

SOIL VAPOR SCREENING LEVELS (ug/m3)	
CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTES:
Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.



GP09-09	9/15/2009 6.5-7.5 ft BGS ug/m3	9/18/2009 6.5-7.5 ft BGS %	10/14/2009 6.5-7.5 ft BGS %	12/9/2009 6.5-7.5 ft BGS %
1,1,1-Trichloroethane	18	-	-	-
Benzene	1.9	-	-	-
Chlorobenzene	1.9	-	-	-
Chloroform (Trichloromethane)	14	-	-	-
cis-1,2-Dichloroethene	1.4	-	-	-
Ethylbenzene	3.2	-	-	-
Methane	-	0.1	0	0
Naphthalene	3.8	-	-	-
Tetrachloroethene	120	-	-	-
Trichloroethene	2000	-	-	-
Xylenes (total)	19	-	-	-



PROFILE VIEW
N.T.S.

Building Characteristics:
Single-story concrete block building constructed prior to 1968. Commercial-use, heavy truck repair. Footprint is 2,000 sq. ft. Ceiling is approximately 20 ft high, sheet metal roof. Not insulated, unsealed and cracked walls. Slab-on-grade, exposed concrete floor with large cracks, majority of the floor is heavily stained, especially at rear of building adjacent to AST and compressor. Not air tight; no weather seals present. Heating provided by overhead natural gas heaters. Wood stove present with vent through west wall. Exterior openings - vents, fans, utility pipe penetrations, 6 windows, large overhead door, man door. May have used clorinated solvents historically in parts washer, now only uses mineral spirits. Occupied weekdays 8 AM - 5 PM by three to four adult workers.

figure 10

PARCEL 3254 - MIDDLETON TRUCKING BUILDING 1
2233 REAR EAST RIVER ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA008 AUG 08/2011

LEGEND

- APPROXIMATE SITE BOUNDARY
- EDGE OF WATER
- PARCEL BOUNDARY
- VAPOR INTRUSION STUDY BUILDING LOCATION
- MW-202 — MONITORING WELL LOCATION
- BH01-09 — SOIL BORING LOCATION
- VAS01 — VAS SAMPLING LOCATION
- GP21-09, GP04-09 — SOIL VAPOR PROBE LOCATION
- TP1 — TEST PIT LOCATION
- TT1 — TEST TRENCH LOCATION
- PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
- PROPOSED INDOOR AIR SAMPLE LOCATION
- PROPOSED CRAWL SPACE AIR SAMPLE LOCATION
- CONTINGENCY INDOOR AIR SAMPLE LOCATION

0 20 50ft

GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

SAMPLE ID — GP09-09; SAMPLE DATE — 9/15/2009; SAMPLE DEPTH — 6.5-7.5 ft. BGS; SAMPLE UNITS — ug/m3; COMPOUND — Tetrachloroethene; CONCENTRATION VALUE — 2000; EXCEEDANCES (yellow highlight)

SOIL VAPOR SCREENING LEVELS (ug/m3)	
CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTES:

Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.

GP09-09	9/15/2009 6.5-7.5 ft BGS ug/m3	9/18/2009 6.5-7.5 ft BGS %	10/14/2009 6.5-7.5 ft BGS %	12/9/2009 6.5-7.5 ft BGS %
1,1,1-Trichloroethane	18	-	-	-
Benzene	1.9	-	-	-
Chlorobenzene	1.9	-	-	-
Chloroform (Trichloromethane)	14	-	-	-
cis-1,2-Dichloroethene	1.4	-	-	-
Ethylbenzene	3.2	-	-	-
Methane	-	0.1	0	0
Naphthalene	3.8	-	-	-
Tetrachloroethene	120	-	-	-
Trichloroethene	2000	-	-	-
Xylenes (total)	19	-	-	-

Building Characteristics:
Single-story, commercial-use office trailer with two unused bedrooms, constructed early 1990s. 685 sq. ft. trailer with crawl space enclosed by wood skirting in poor condition, over a concrete pad. Concrete and wood appear damp. Insulated trailer with average air tightness, weather seals in fair condition. Heating provided by forced air propane furnace. Central A/C present. Exterior openings - vents, utility pipe penetrations, windows, doors.
Variable occupancy, several hours every few weeks by 2 adult occupants.

figure 11

PARCEL 4610 - ARA TRUCKING BUILDING A
2225A EAST RIVER ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA009 AUG 08/2011

LEGEND

- APPROXIMATE SITE BOUNDARY
- EDGE OF WATER
- PARCEL BOUNDARY
- VAPOR INTRUSION STUDY BUILDING LOCATION
- MW-202 MONITORING WELL LOCATION
- BH01-09 SOIL BORING LOCATION
- VAS01 VAS SAMPLING LOCATION
- GP21-09 / GP04-09 SOIL VAPOR PROBE LOCATION
- TP1 TEST PIT LOCATION
- TT1 TEST TRENCH LOCATION
- PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
- PROPOSED INDOOR AIR SAMPLE LOCATION
- PROPOSED CRAWL SPACE AIR SAMPLE LOCATION
- CONTINGENCY INDOOR AIR SAMPLE LOCATION

0 20 50ft

GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

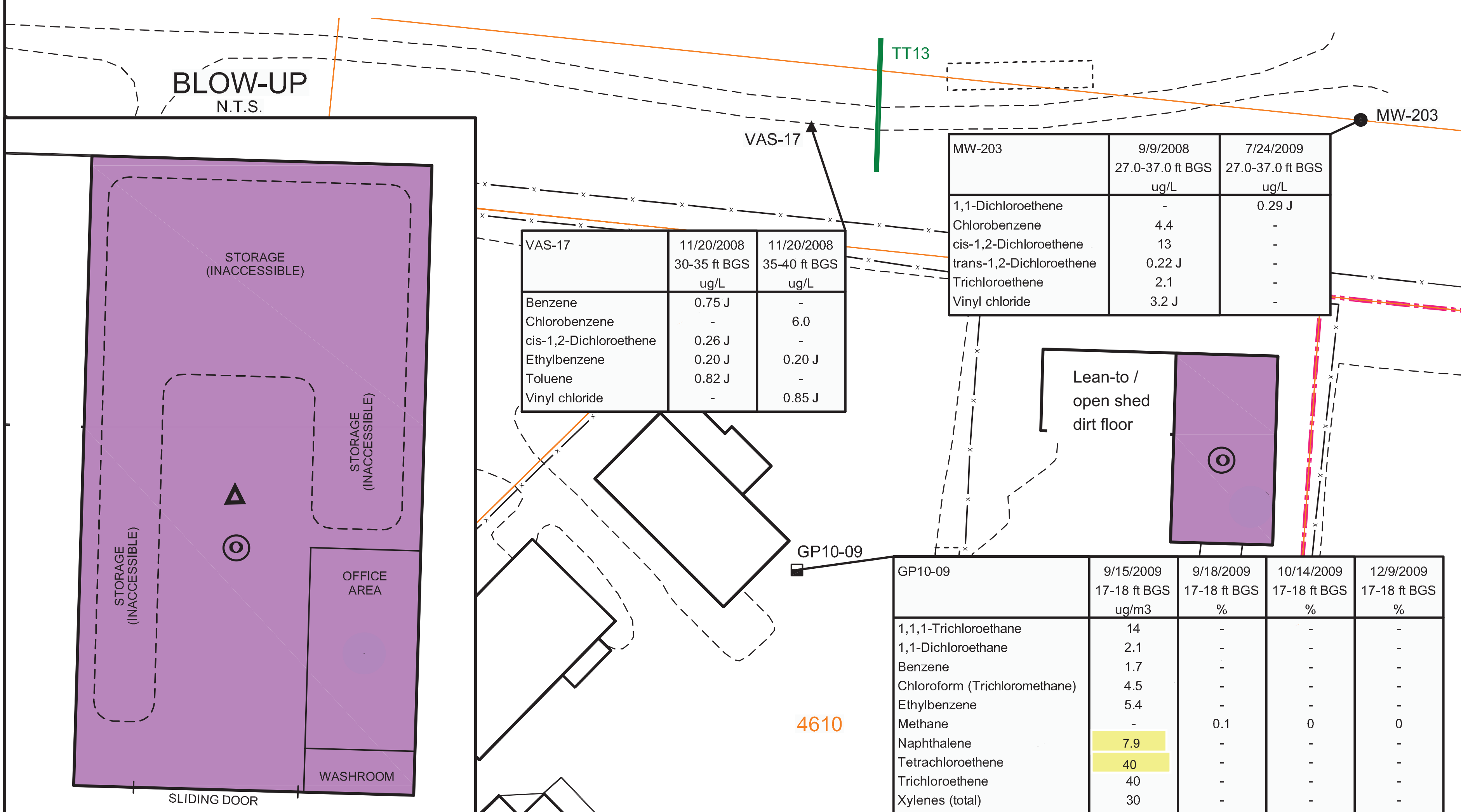
SAMPLE DATE
SAMPLE DEPTH
SAMPLE UNITS
CONCENTRATION VALUE
COMPOUND
SAMPLE ID
EXCEEDANCES

SOIL VAPOR SCREENING LEVELS (ug/m3)

CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTE: THERE IS ANOTHER SOIL VAPOR SAMPLE LOCATED NEARBY (GP09-09). SEE FIGURE 3.

NOTES:
Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.

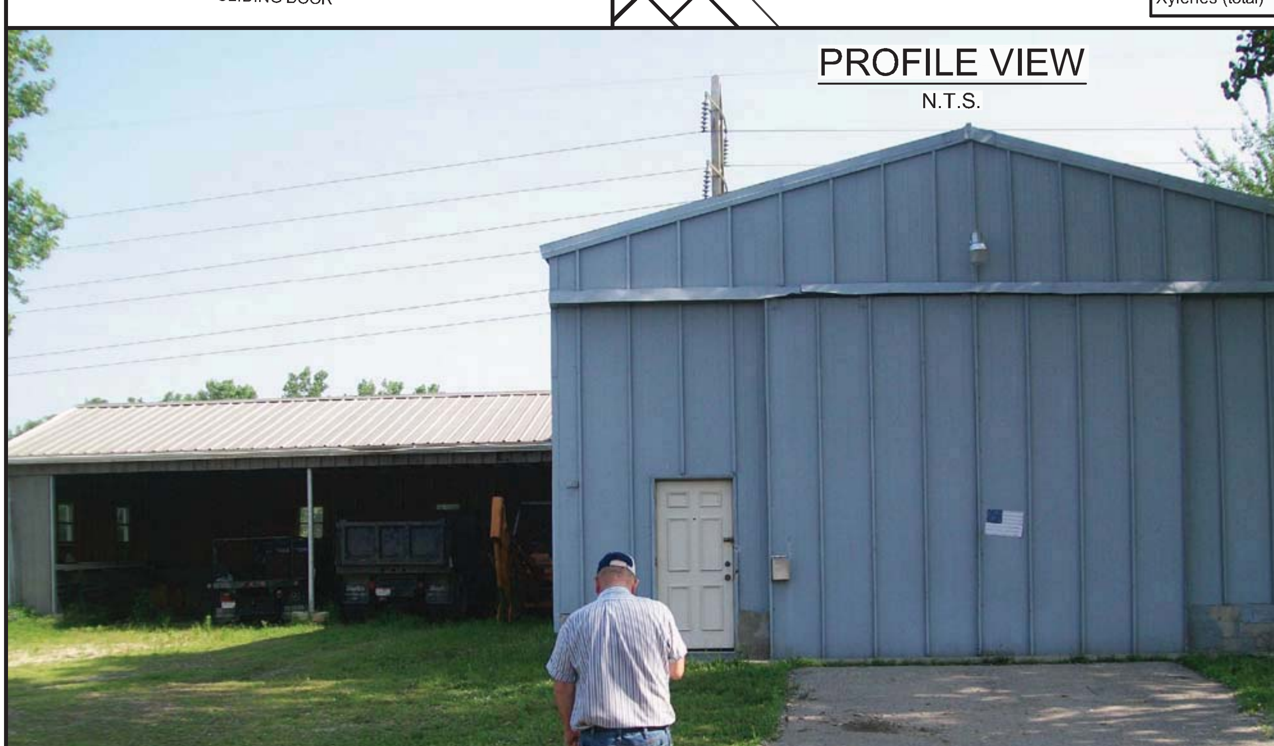


VAS-17	11/20/2008 30-35 ft BGS ug/L	11/20/2008 35-40 ft BGS ug/L
Benzene	0.75 J	-
Chlorobenzene	-	6.0
cis-1,2-Dichloroethene	0.26 J	-
Ethylbenzene	0.20 J	0.20 J
Toluene	0.82 J	-
Vinyl chloride	-	0.85 J

MW-203	9/9/2008 27.0-37.0 ft BGS ug/L	7/24/2009 27.0-37.0 ft BGS ug/L
1,1-Dichloroethene	-	0.29 J
Chlorobenzene	4.4	-
cis-1,2-Dichloroethene	13	-
trans-1,2-Dichloroethene	0.22 J	-
Trichloroethene	2.1	-
Vinyl chloride	3.2 J	-

GP10-09	9/15/2009 17-18 ft BGS ug/m3	9/18/2009 17-18 ft BGS %	10/14/2009 17-18 ft BGS %	12/9/2009 17-18 ft BGS %
1,1,1-Trichloroethane	14	-	-	-
1,1-Dichloroethane	2.1	-	-	-
Benzene	1.7	-	-	-
Chloroform (Trichloromethane)	4.5	-	-	-
Ethylbenzene	5.4	-	-	-
Methane	-	0.1	0	0
Naphthalene	7.9	-	-	-
Tetrachloroethene	40	-	-	-
Trichloroethene	40	-	-	-
Xylenes (total)	30	-	-	-

PROFILE VIEW
N.T.S.



Building Characteristics:
Single-story commercial-use storage building, constructed prior to 1993. Primarily warehouse space with modular office space (not currently in use). Attached open garage with dirt floor. Footprint is 1,800 sq. ft (without garage). Approximately 20 ft high ceilings. Concrete block foundation walls in poor condition. Constructed with wood frame and steel beams, covered with steel cladding. Slab-on-grade, exposed concrete floor with large cracks. Not air tight, no weather seals. No HVAC system present in building. Window A/C unit present in office, draws air from warehouse. Exterior openings - large sliding door, man door. Occasional occupancy two to three times per month to pick up or drop off storage items.

figure 12

PARCEL 4610 - RON BARNETT CONSTRUCTION BUILDING B
2225B EAST RIVER ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA010 AUG 08/2011

LEGEND

- APPROXIMATE SITE BOUNDARY
- EDGE OF WATER
- PARCEL BOUNDARY
- VAPOR INTRUSION STUDY BUILDING LOCATION
- MW-202 — MONITORING WELL LOCATION
- BH01-09 — SOIL BORING LOCATION
- VAS01 — VAS SAMPLING LOCATION
- GP21-09, GP04-09 — SOIL VAPOR PROBE LOCATION
- TP1 — TEST PIT LOCATION
- TT1 — TEST TRENCH LOCATION
- PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
- PROPOSED INDOOR AIR SAMPLE LOCATION
- PROPOSED CRAWL SPACE AIR SAMPLE LOCATION

0 20 50ft

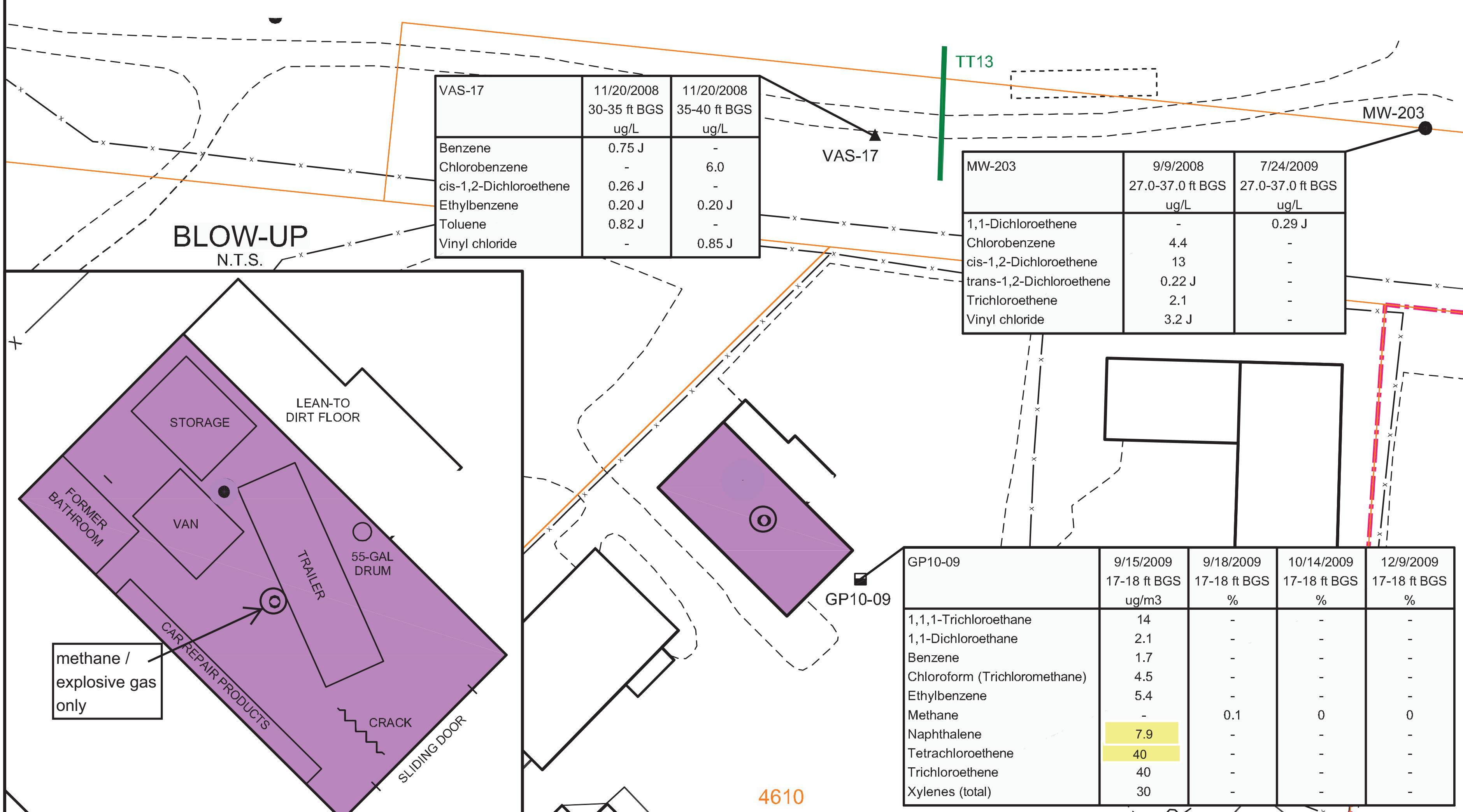
GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

SAMPLE ID
SAMPLE DATE
SAMPLE DEPTH
SAMPLE UNITS
CONCENTRATION VALUE
COMPOUND
EXCEEDANCES

SOIL VAPOR SCREENING LEVELS (ug/m3)	
CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTE: THERE IS ANOTHER SOIL VAPOR SAMPLE LOCATED NEARBY (GP09-09). SEE FIGURE 3.

NOTES:
Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.



VAS-17	11/20/2008 30-35 ft BGS ug/L	11/20/2008 35-40 ft BGS ug/L
Benzene	0.75 J	-
Chlorobenzene	-	6.0
cis-1,2-Dichloroethene	0.26 J	-
Ethylbenzene	0.20 J	0.20 J
Toluene	0.82 J	-
Vinyl chloride	-	0.85 J

MW-203	9/9/2008 27.0-37.0 ft BGS ug/L	7/24/2009 27.0-37.0 ft BGS ug/L
1,1-Dichloroethene	-	0.29 J
Chlorobenzene	4.4	-
cis-1,2-Dichloroethene	13	-
trans-1,2-Dichloroethene	0.22 J	-
Trichloroethene	2.1	-
Vinyl chloride	3.2 J	-

GP10-09	9/15/2009 17-18 ft BGS ug/m3	9/18/2009 17-18 ft BGS %	10/14/2009 17-18 ft BGS %	12/9/2009 17-18 ft BGS %
1,1,1-Trichloroethane	14	-	-	-
1,1-Dichloroethane	2.1	-	-	-
Benzene	1.7	-	-	-
Chloroform (Trichloromethane)	4.5	-	-	-
Ethylbenzene	5.4	-	-	-
Methane	-	0.1	0	0
Naphthalene	7.9	-	-	-
Tetrachloroethene	40	-	-	-
Trichloroethene	40	-	-	-
Xylenes (total)	30	-	-	-

PROFILE VIEW
N.T.S.

Building Characteristics:
Single-story commercial-use storage building, constructed in early 1990s. 1,088 sq. ft slab-on-grade, approximately 16 ft high building with fair condition, unsealed foundation and floor cracks. Constructed with wood frame, covered with steel cladding. Not air tight, no weather seals. No HVAC system present in building. Exterior openings - sliding door and personnel door.
No regular occupancy - storage only

figure 13
PARCEL 4610 - RON BARNETT CONSTRUCTION BUILDING C
2225C EAST RIVER ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA011 AUG 08/2011

LEGEND

- APPROXIMATE SITE BOUNDARY
- EDGE OF WATER
- PARCEL BOUNDARY
- VAPOR INTRUSION STUDY BUILDING LOCATION
- MW-202 — MONITORING WELL LOCATION
- BH01-09 — SOIL BORING LOCATION
- VAS01 — VAS SAMPLING LOCATION
- GP21-09, GP04-09 — SOIL VAPOR PROBE LOCATION
- TP1 — TEST PIT LOCATION
- TT1 — TEST TRENCH LOCATION
- PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
- PROPOSED INDOOR AIR SAMPLE LOCATION
- PROPOSED CRAWL SPACE AIR SAMPLE LOCATION

GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

- GP09-09 — SAMPLE ID
- 9/15/2009 — SAMPLE DATE
- 6.5-7.5 ft. BGS — SAMPLE DEPTH
- ug/m3 — SAMPLE UNITS
- 2000 — CONCENTRATION VALUE
- Tetrachloroethene — COMPOUND
- EXCEEDANCES (yellow highlight)

0 20 50ft

SOIL VAPOR SCREENING LEVELS (ug/m3)

CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTE: THERE IS ANOTHER SOIL VAPOR SAMPLE LOCATED NEARBY (GP09-09). SEE FIGURE 3.

NOTES:
Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.

GP10-09	9/15/2009 17-18 ft BGS ug/m3	9/18/2009 17-18 ft BGS %	10/14/2009 17-18 ft BGS %	12/9/2009 17-18 ft BGS %
1,1,1-Trichloroethane	14	-	-	-
1,1-Dichloroethane	2.1	-	-	-
Benzene	1.7	-	-	-
Chloroform (Trichloromethane)	4.5	-	-	-
Ethylbenzene	5.4	-	-	-
Methane	-	0.1	0	0
Naphthalene	7.9	-	-	-
Tetrachloroethene	40	-	-	-
Trichloroethene	40	-	-	-
Xylenes (total)	30	-	-	-

PROFILE VIEW

N.T.S.

Building Characteristics:
Single-story commercial-use storage building, constructed prior to 1993. Attached open garage with dirt floor. Footprint is 1,200 sq. ft (without garage). Approximately 16 ft high ceilings. Constructed with wood frame, covered with plywood and steel cladding. Plywood partition, open at the top, divides the interior space. Slab-on-grade, exposed concrete floor with some cracks. Not air tight, no weather seals. No HVAC system present in building. Exterior openings - 2 large sliding doors, 2 man doors. No regular occupancy, storage only.

figure 14

PARCEL 4610 - RON BARNETT CONSTRUCTION BUILDING D
2225D EAST RIVER ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA012 AUG 08/2011

LEGEND

- APPROXIMATE SITE BOUNDARY
- EDGE OF WATER
- PARCEL BOUNDARY
- VAPOR INTRUSION STUDY BUILDING LOCATION
- MW-202 MONITORING WELL LOCATION
- BH01-09 SOIL BORING LOCATION
- VAS01 VAS SAMPLING LOCATION
- GP21-09, GP04-09 SOIL VAPOR PROBE LOCATION
- TP1 TEST PIT LOCATION
- TT1 TEST TRENCH LOCATION
- PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
- PROPOSED INDOOR AIR SAMPLE LOCATION
- PROPOSED CRAWL SPACE AIR SAMPLE LOCATION
- CONTINGENCY INDOOR AIR SAMPLE LOCATION

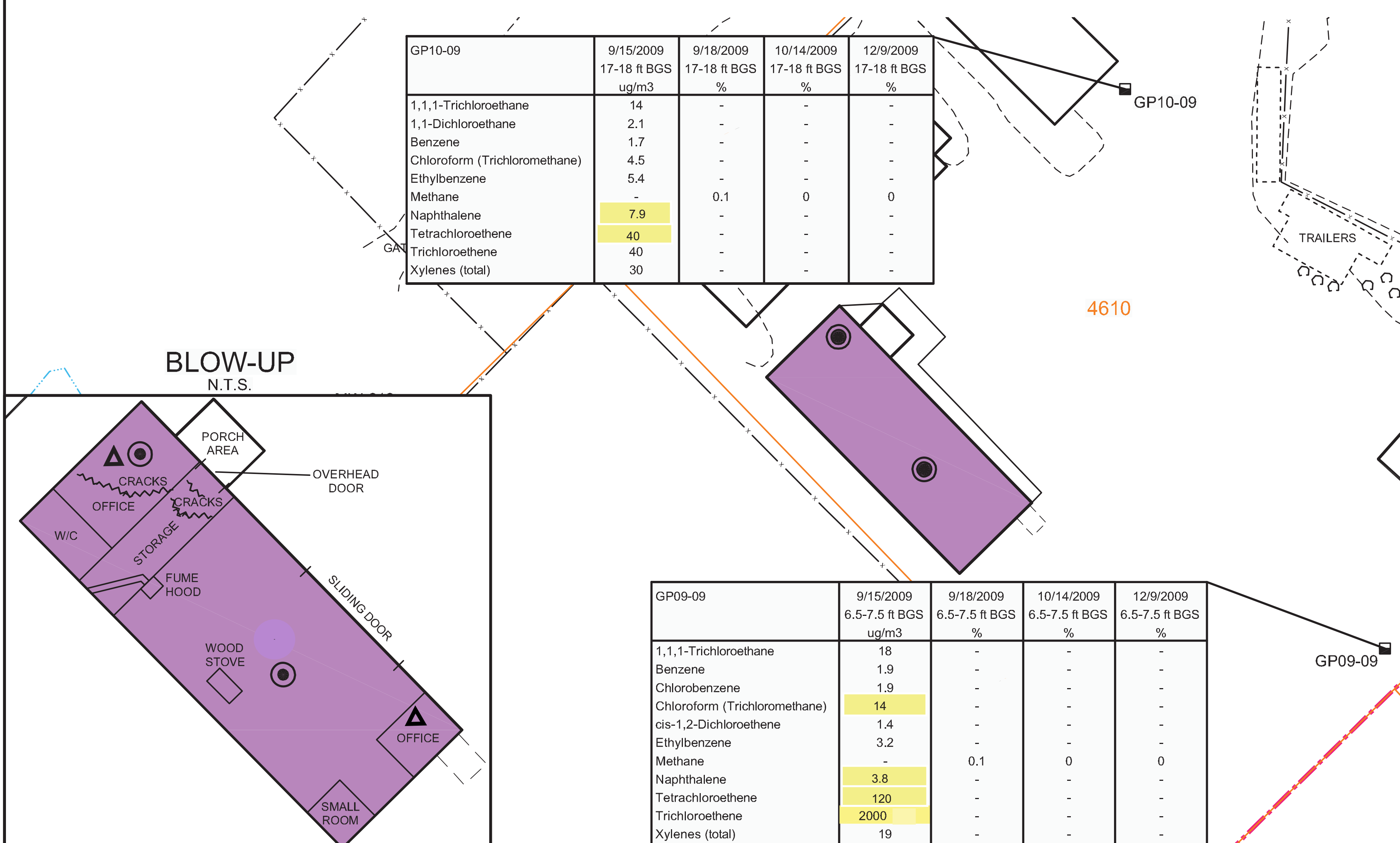
0 20 50ft

GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

SAMPLE DATE
SAMPLE DEPTH
SAMPLE UNITS
CONCENTRATION VALUE
COMPOUND
SAMPLE ID
EXCEEDANCES

SOIL VAPOR SCREENING LEVELS (ug/m3)	
CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTES:
Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.



GP10-09	9/15/2009 17-18 ft BGS ug/m3	9/18/2009 17-18 ft BGS %	10/14/2009 17-18 ft BGS %	12/9/2009 17-18 ft BGS %
1,1,1-Trichloroethane	14	-	-	-
1,1-Dichloroethane	2.1	-	-	-
Benzene	1.7	-	-	-
Chloroform (Trichloromethane)	4.5	-	-	-
Ethylbenzene	5.4	-	-	-
Methane	-	0.1	0	0
Naphthalene	7.9	-	-	-
Tetrachloroethene	40	-	-	-
Trichloroethene	40	-	-	-
Xylenes (total)	30	-	-	-

GP09-09	9/15/2009 6.5-7.5 ft BGS ug/m3	9/18/2009 6.5-7.5 ft BGS %	10/14/2009 6.5-7.5 ft BGS %	12/9/2009 6.5-7.5 ft BGS %
1,1,1-Trichloroethane	18	-	-	-
Benzene	1.9	-	-	-
Chlorobenzene	1.9	-	-	-
Chloroform (Trichloromethane)	14	-	-	-
cis-1,2-Dichloroethene	1.4	-	-	-
Ethylbenzene	3.2	-	-	-
Methane	-	0.1	0	0
Naphthalene	3.8	-	-	-
Tetrachloroethene	120	-	-	-
Trichloroethene	2000	-	-	-
Xylenes (total)	19	-	-	-

PROFILE VIEW
N.T.S.

Building Characteristics:
Single-story commercial-use car repair building with office and storage areas, construction completed by early 1990s. 1,200 sq. ft. unsealed, four-inch concrete slab-on-grade, approximately 20 ft. high building, with steel cladding. Significant floor cracks in office and adjacent storage area. Not air tight, weather seals in office are in fair condition, no weather seals in storage area. Electric baseboard heating and window A/C present in office. Wood stove present, vents through roof. Exterior openings - utility pipe penetrations, windows, sliding bay and overhead garage doors.
No regularly scheduled occupancy - occasional evening and weekend occupancy by two adults.
Office may be occupied during normal working hours by one adult.

figure 15

PARCEL 4610 - RON BARNETT CONSTRUCTION BUILDING E
2225E EAST RIVER ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA013 AUG 08/2011

0 20 50ft

LEGEND

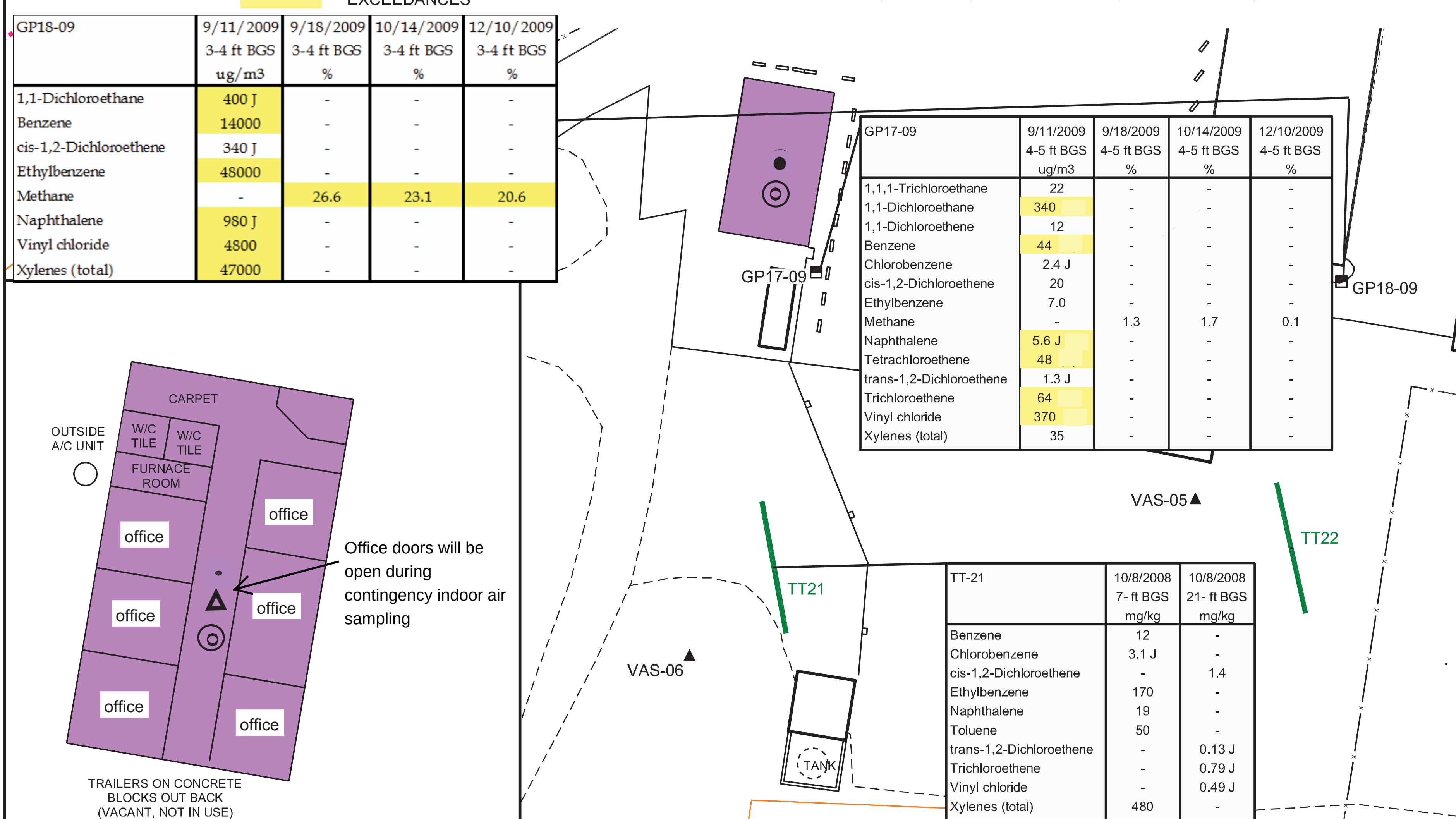
- APPROXIMATE SITE BOUNDARY
- EDGE OF WATER
- PARCEL BOUNDARY
- VAPOR INTRUSION STUDY BUILDING LOCATION
- MW-202 MONITORING WELL LOCATION
- BH01-09 SOIL BORING LOCATION
- VAS01 VAS SAMPLING LOCATION
- GP21-09 / GP04-09 SOIL VAPOR PROBE LOCATION
- TP1 TEST PIT LOCATION
- TT1 TEST TRENCH LOCATION
- PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
- PROPOSED INDOOR AIR SAMPLE LOCATION
- PROPOSED CRAWL SPACE AIR SAMPLE LOCATION
- CONTINGENCY INDOOR AIR SAMPLE LOCATION

GP09-09	9/15/2009 — SAMPLE DATE
	6.5-7.5 ft. BGS — SAMPLE DEPTH
	ug/m3 — SAMPLE UNITS
Tetrachloroethene	2000

CONCENTRATION VALUE
COMPOUND
SAMPLE ID
EXCEEDANCES

SOIL VAPOR SCREENING LEVELS (ug/m3)	
CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTES:
Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.



GP18-09	9/11/2009 3-4 ft BGS ug/m3	9/18/2009 3-4 ft BGS %	10/14/2009 3-4 ft BGS %	12/10/2009 3-4 ft BGS %
1,1-Dichloroethane	400 J	-	-	-
Benzene	14000	-	-	-
cis-1,2-Dichloroethene	340 J	-	-	-
Ethylbenzene	48000	-	-	-
Methane	-	26.6	23.1	20.6
Naphthalene	980 J	-	-	-
Vinyl chloride	4800	-	-	-
Xylenes (total)	47000	-	-	-

GP17-09	9/11/2009 4-5 ft BGS ug/m3	9/18/2009 4-5 ft BGS %	10/14/2009 4-5 ft BGS %	12/10/2009 4-5 ft BGS %
1,1,1-Trichloroethane	22	-	-	-
1,1-Dichloroethane	340	-	-	-
1,1-Dichloroethene	12	-	-	-
Benzene	44	-	-	-
Chlorobenzene	2.4 J	-	-	-
cis-1,2-Dichloroethene	20	-	-	-
Ethylbenzene	7.0	-	-	-
Methane	-	1.3	1.7	0.1
Naphthalene	5.6 J	-	-	-
Tetrachloroethene	48	-	-	-
trans-1,2-Dichloroethene	1.3 J	-	-	-
Trichloroethene	64	-	-	-
Vinyl chloride	370	-	-	-
Xylenes (total)	35	-	-	-

TT-21	10/8/2008 7- ft BGS mg/kg	10/8/2008 21- ft BGS mg/kg
Benzene	12	-
Chlorobenzene	3.1 J	-
cis-1,2-Dichloroethene	-	1.4
Ethylbenzene	170	-
Naphthalene	19	-
Toluene	50	-
trans-1,2-Dichloroethene	-	0.13 J
Trichloroethene	-	0.79 J
Vinyl chloride	-	0.49 J
Xylenes (total)	480	-

PROFILE VIEW
N.T.S.

Building Characteristics:
Single-story commercial-use storage building, constructed prior to 1993. Footprint is 1,500 sq. ft. Primarily office space (6 single offices) with bathrooms and kitchenette. 8 ft drop ceilings. Brick building with steel cladding, windows are inoperable. Concrete slab-on-grade, covered with wall-to-wall carpeting. Average air tightness, weather seals in fair condition. Heating provided by forced air natural gas furnace, central A/C from exterior ground unit. Exterior openings - vents, utility pipe penetrations, 2 man doors. Building has been vacant for 4 to 5 years.

figure 16

PARCEL 5054 - VALLEY ASPHALT PLANT BUILDING 1
1901 DRYDEN ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA014 AUG 08/2011

LEGEND

- APPROXIMATE SITE BOUNDARY
- EDGE OF WATER
- PARCEL BOUNDARY
- VAPOR INTRUSION STUDY BUILDING LOCATION
- MW-202 MONITORING WELL LOCATION
- BH01-09 SOIL BORING LOCATION
- VAS01 VAS SAMPLING LOCATION
- GP21-09, GP04-09 SOIL VAPOR PROBE LOCATION
- TP1 TEST PIT LOCATION
- TT1 TEST TRENCH LOCATION
- PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
- PROPOSED INDOOR AIR SAMPLE LOCATION
- PROPOSED CRAWL SPACE AIR SAMPLE LOCATION
- CONTINGENCY INDOOR AIR SAMPLE LOCATION

0 20 50ft

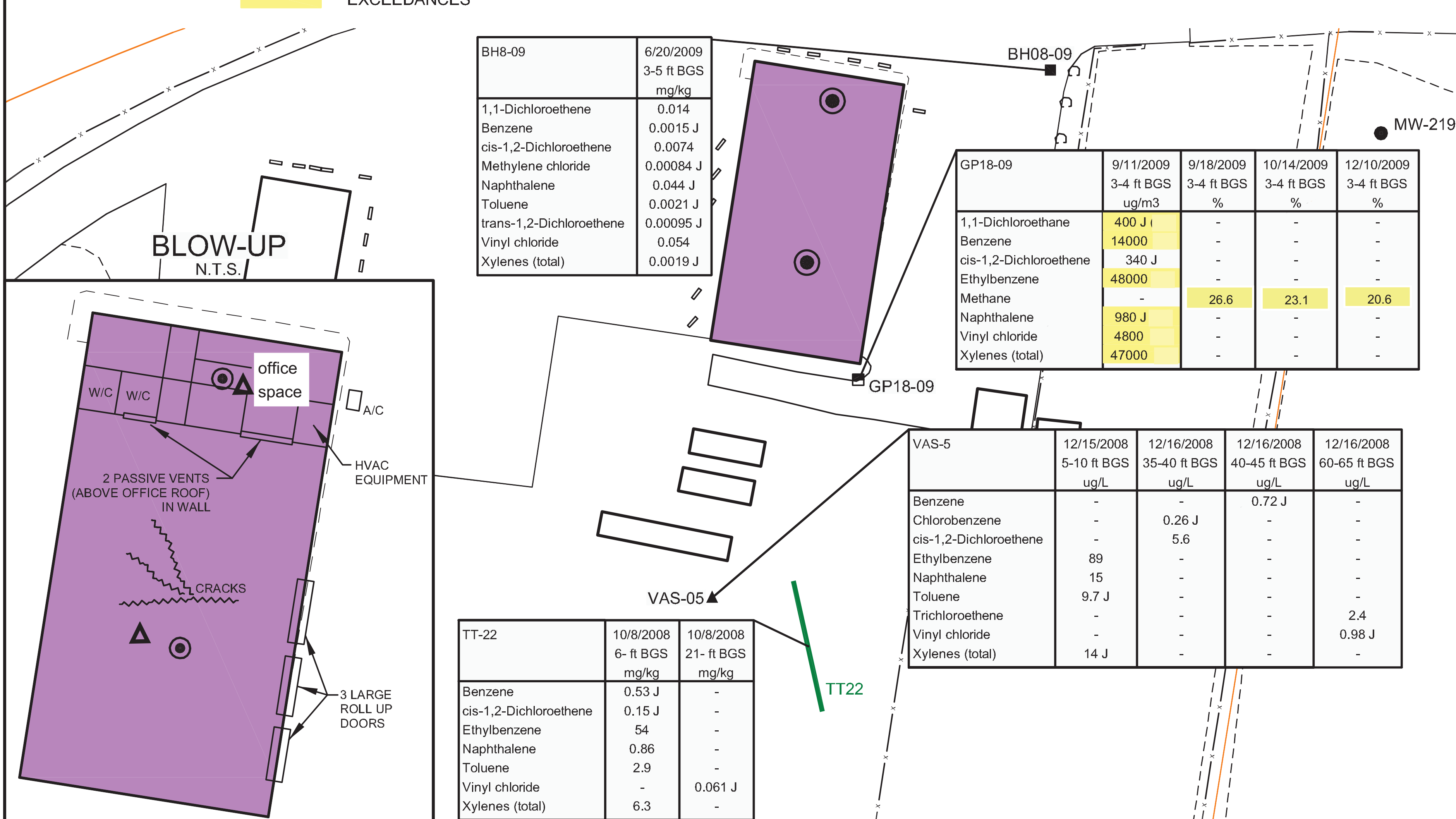
GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

SAMPLE ID; SAMPLE DATE; SAMPLE DEPTH; SAMPLE UNITS; CONCENTRATION VALUE; COMPOUND; EXCEEDANCES

SOIL VAPOR SCREENING LEVELS (ug/m3)	
CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTE: THERE IS ANOTHER SOIL VAPOR SAMPLE LOCATED NEARBY (GP17-09). SEE FIGURE 3.

NOTES:
Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.



BH8-09	6/20/2009 3-5 ft BGS mg/kg
1,1-Dichloroethane	0.014
Benzene	0.0015 J
cis-1,2-Dichloroethene	0.0074
Methylene chloride	0.00084 J
Naphthalene	0.044 J
Toluene	0.0021 J
trans-1,2-Dichloroethene	0.00095 J
Vinyl chloride	0.054
Xylenes (total)	0.0019 J

GP18-09	9/11/2009 3-4 ft BGS ug/m3	9/18/2009 3-4 ft BGS %	10/14/2009 3-4 ft BGS %	12/10/2009 3-4 ft BGS %
1,1-Dichloroethane	400 J	-	-	-
Benzene	14000	-	-	-
cis-1,2-Dichloroethene	340 J	-	-	-
Ethylbenzene	48000	-	-	-
Methane	-	26.6	23.1	20.6
Naphthalene	980 J	-	-	-
Vinyl chloride	4800	-	-	-
Xylenes (total)	47000	-	-	-

VAS-5	12/15/2008 5-10 ft BGS ug/L	12/16/2008 35-40 ft BGS ug/L	12/16/2008 40-45 ft BGS ug/L	12/16/2008 60-65 ft BGS ug/L
Benzene	-	-	0.72 J	-
Chlorobenzene	-	0.26 J	-	-
cis-1,2-Dichloroethene	-	5.6	-	-
Ethylbenzene	89	-	-	-
Naphthalene	15	-	-	-
Toluene	9.7 J	-	-	-
Trichloroethene	-	-	-	2.4
Vinyl chloride	-	-	-	0.98 J
Xylenes (total)	14 J	-	-	-

TT-22	10/8/2008 6- ft BGS mg/kg	10/8/2008 21- ft BGS mg/kg
Benzene	0.53 J	-
cis-1,2-Dichloroethene	0.15 J	-
Ethylbenzene	54	-
Naphthalene	0.86	-
Toluene	2.9	-
Vinyl chloride	-	0.061 J
Xylenes (total)	6.3	-

PROFILE VIEW
N.T.S.

Building Characteristics:
Single-story commercial/industrial-use building, constructed prior to 1959. Building divided into two sections with cracked cinder block wall between. Footprint is 4,888 sq. ft. Exterior openings - vents, fans, utility pipe penetrations, windows, bay doors, man doors. Building has been vacant for over 10 years.
Northern 1/4 of the building is brick, single story, office space, concrete slab-on-grade with wall-to-wall carpet (strong moldy/musty odor). Average air tightness. Heating provided by forced air natural gas furnace, central A/C from exterior ground unit.
Southern 3/4 of the building is steel, double-arch Quonset hut with bare concrete floor (visibly cracked in areas), used for storage. Not air tight, no weather seals present, broken windows. No HVAC.

figure 17

PARCEL 5054 - VALLEY ASPHALT PLANT BUILDING 2
1903 DRYDEN ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA015 AUG 08/2011

LEGEND

- APPROXIMATE SITE BOUNDARY
- EDGE OF WATER
- PARCEL BOUNDARY
- VAPOR INTRUSION STUDY BUILDING LOCATION
- MW-202 MONITORING WELL LOCATION
- BH01-09 SOIL BORING LOCATION
- VAS01 VAS SAMPLING LOCATION
- GP21-09 / GP04-09 SOIL VAPOR PROBE LOCATION
- TP1 TEST PIT LOCATION
- TT1 TEST TRENCH LOCATION
- PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
- PROPOSED INDOOR AIR SAMPLE LOCATION
- PROPOSED CRAWL SPACE AIR SAMPLE LOCATION

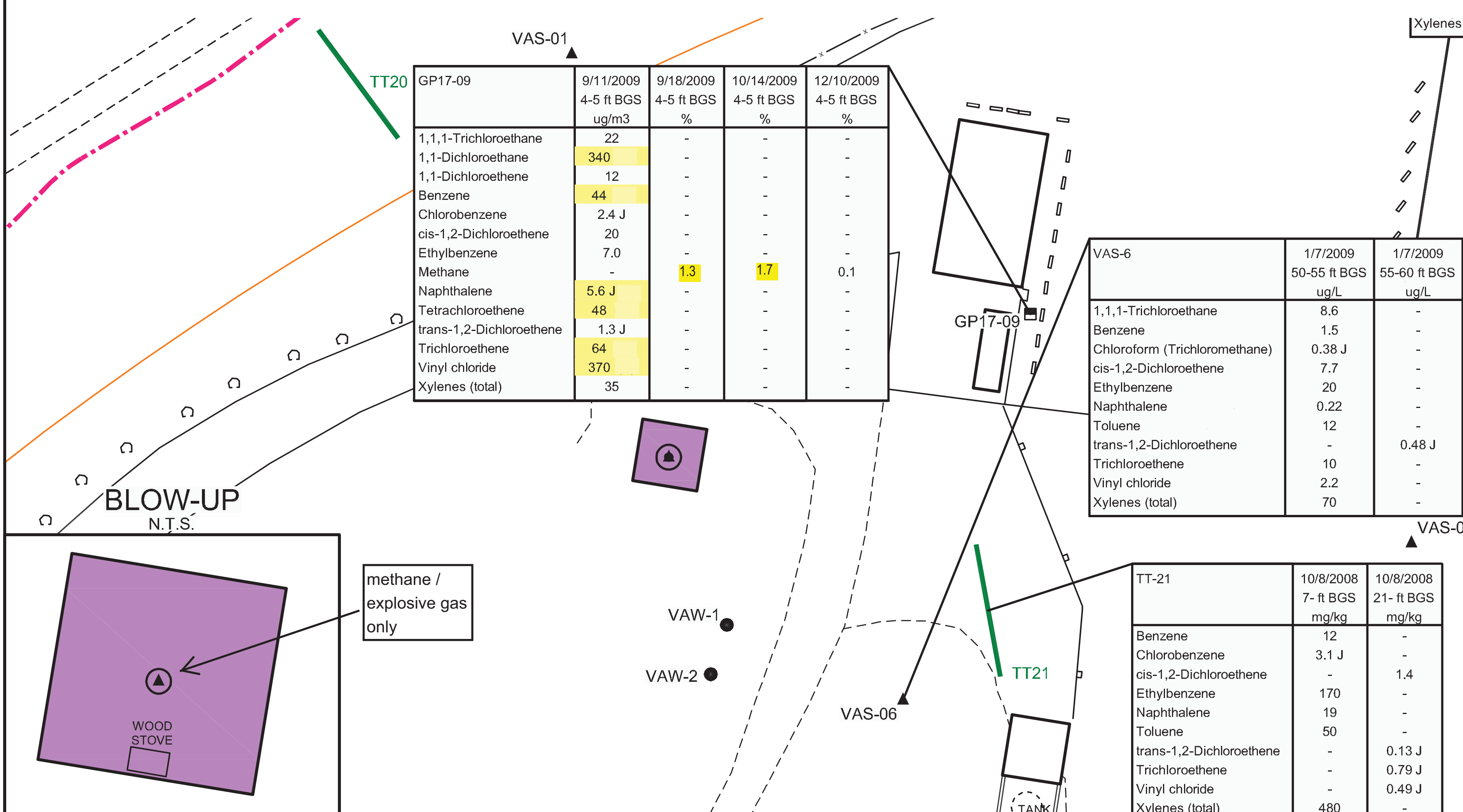
0 20 50ft

GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

SAMPLE ID
SAMPLE DATE
SAMPLE DEPTH
SAMPLE UNITS
CONCENTRATION VALUE
COMPOUND
EXCEEDANCES

SOIL VAPOR SCREENING LEVELS (ug/m3)	
CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTES:
Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.



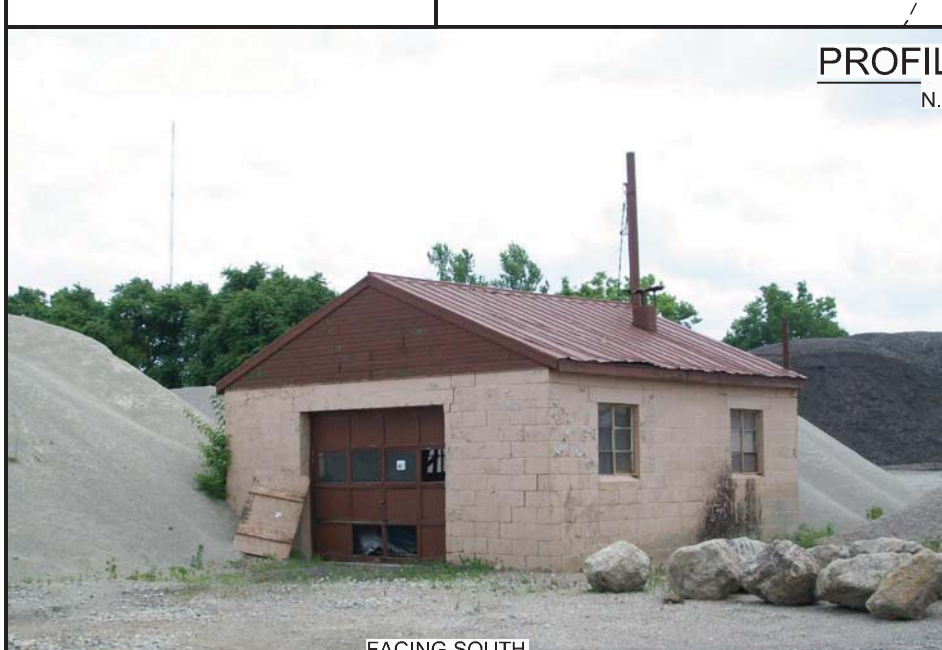
GP17-09	9/11/2009 4-5 ft BGS ug/m3	9/18/2009 4-5 ft BGS %	10/14/2009 4-5 ft BGS %	12/10/2009 4-5 ft BGS %
1,1,1-Trichloroethane	22	-	-	-
1,1-Dichloroethane	340	-	-	-
1,1-Dichloroethene	12	-	-	-
Benzene	44	-	-	-
Chlorobenzene	2.4 J	-	-	-
cis-1,2-Dichloroethene	20	-	-	-
Ethylbenzene	7.0	-	-	-
Methane	-	1.3	1.7	0.1
Naphthalene	5.6 J	-	-	-
Tetrachloroethene	48	-	-	-
trans-1,2-Dichloroethene	1.3 J	-	-	-
Trichloroethene	64	-	-	-
Vinyl chloride	370	-	-	-
Xylenes (total)	35	-	-	-

VAS-6	1/7/2009 50-55 ft BGS ug/L	1/7/2009 55-60 ft BGS ug/L
1,1,1-Trichloroethane	8.6	-
Benzene	1.5	-
Chloroform (Trichloromethane)	0.38 J	-
cis-1,2-Dichloroethene	7.7	-
Ethylbenzene	20	-
Naphthalene	0.22	-
Toluene	12	-
trans-1,2-Dichloroethene	-	0.48 J
Trichloroethene	10	-
Vinyl chloride	2.2	-
Xylenes (total)	70	-

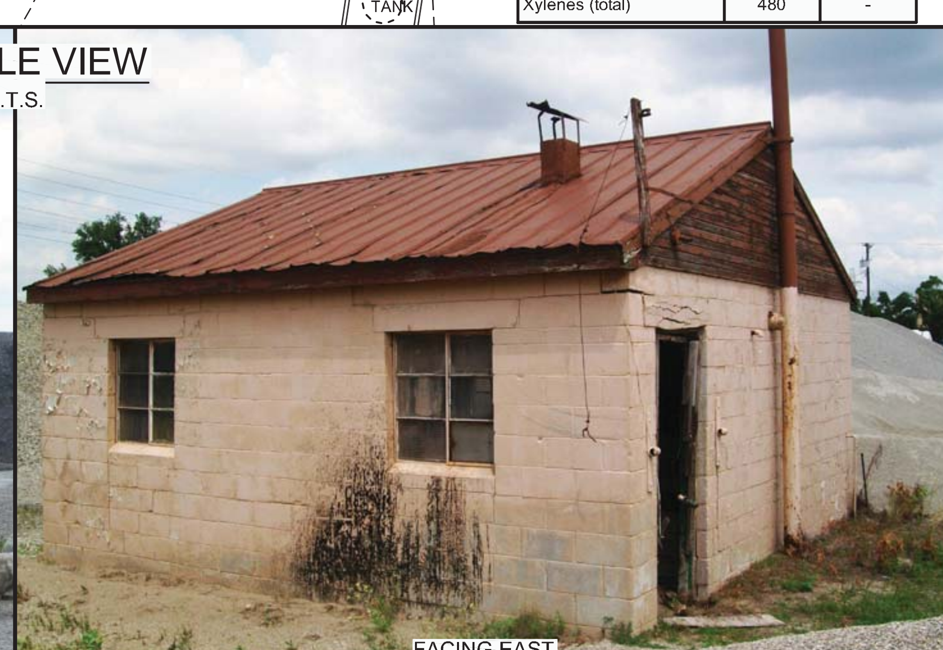
TT-21	10/8/2008 7- ft BGS mg/kg	10/8/2008 21- ft BGS mg/kg
Benzene	12	-
Chlorobenzene	3.1 J	-
cis-1,2-Dichloroethene	-	1.4
Ethylbenzene	170	-
Naphthalene	19	-
Toluene	50	-
trans-1,2-Dichloroethene	-	0.13 J
Trichloroethene	-	0.79 J
Vinyl chloride	-	0.49 J
Xylenes (total)	480	-

PROFILE VIEW

N.T.S.



FACING SOUTH



FACING EAST

Building Characteristics:
Single-story industrial-use building, formerly used as a garage.
Footprint is 457 sq. ft. Concrete block building, windows are inoperable. Gravel and earthen floor. Not insulated, not air tight; missing man door and panels on overhead door. Wood stove present, no other HVAC systems present. Building has been vacant for multiple years.

figure 18

PARCEL 5054 - VALLEY ASPHALT PLANT BUILDING 3
1901 DRYDEN ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

LEGEND

- APPROXIMATE SITE BOUNDARY
- EDGE OF WATER
- PARCEL BOUNDARY
- VAPOR INTRUSION STUDY BUILDING LOCATION
- MW-202 — MONITORING WELL LOCATION
- BH01-09 — SOIL BORING LOCATION
- VAS01 — VAS SAMPLING LOCATION
- GP21-09, GP04-09 — SOIL VAPOR PROBE LOCATION
- TP1 — TEST PIT LOCATION
- TT1 — TEST TRENCH LOCATION
- PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
- PROPOSED INDOOR AIR SAMPLE LOCATION
- PROPOSED CRAWL SPACE AIR SAMPLE LOCATION
- CONTINGENCY INDOOR AIR SAMPLE LOCATION

0 20 50ft

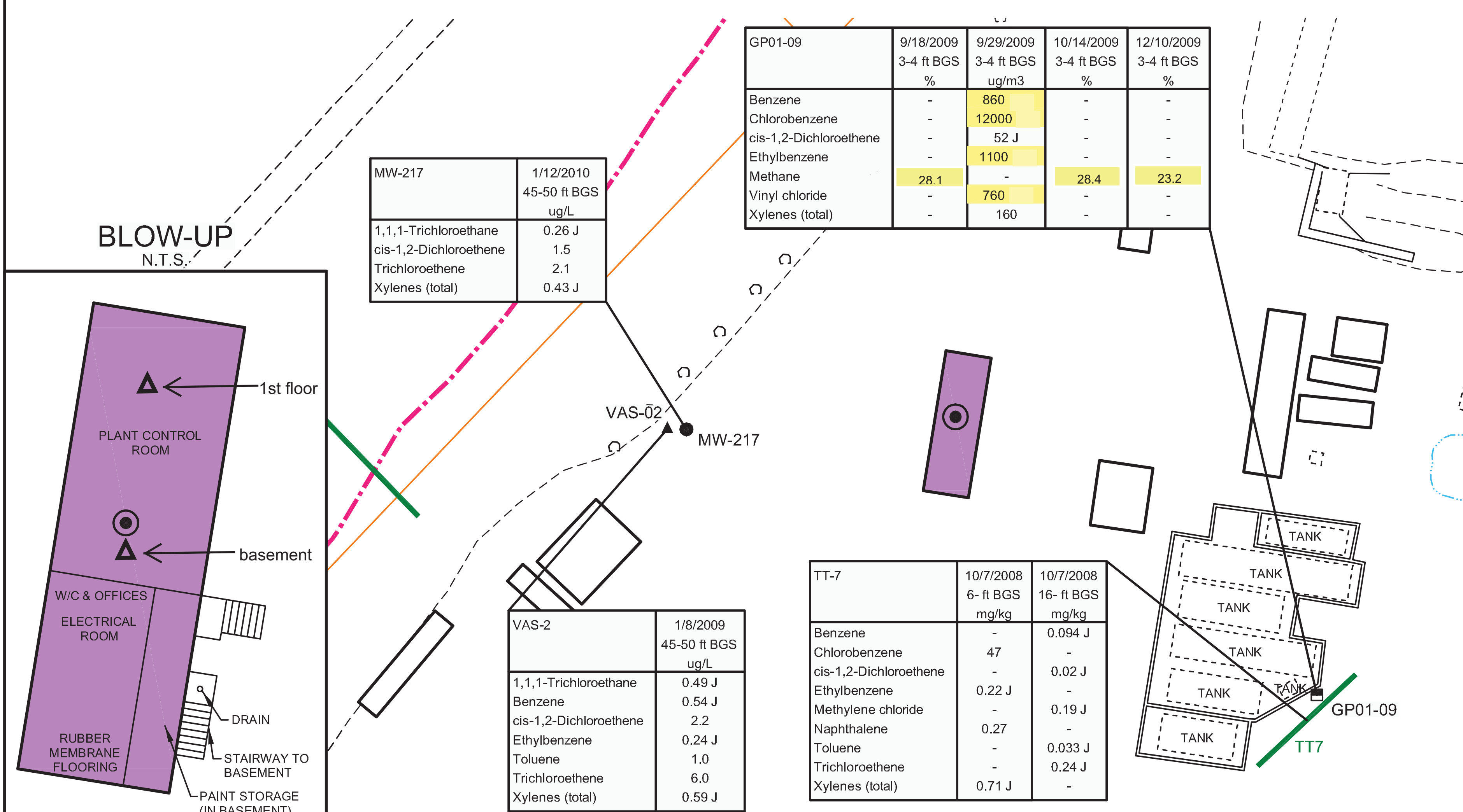
GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

SAMPLE DATE
SAMPLE DEPTH
SAMPLE UNITS
CONCENTRATION VALUE
COMPOUND
SAMPLE ID
EXCEEDANCES

SOIL VAPOR SCREENING LEVELS (ug/m3)

CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTES:
Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.



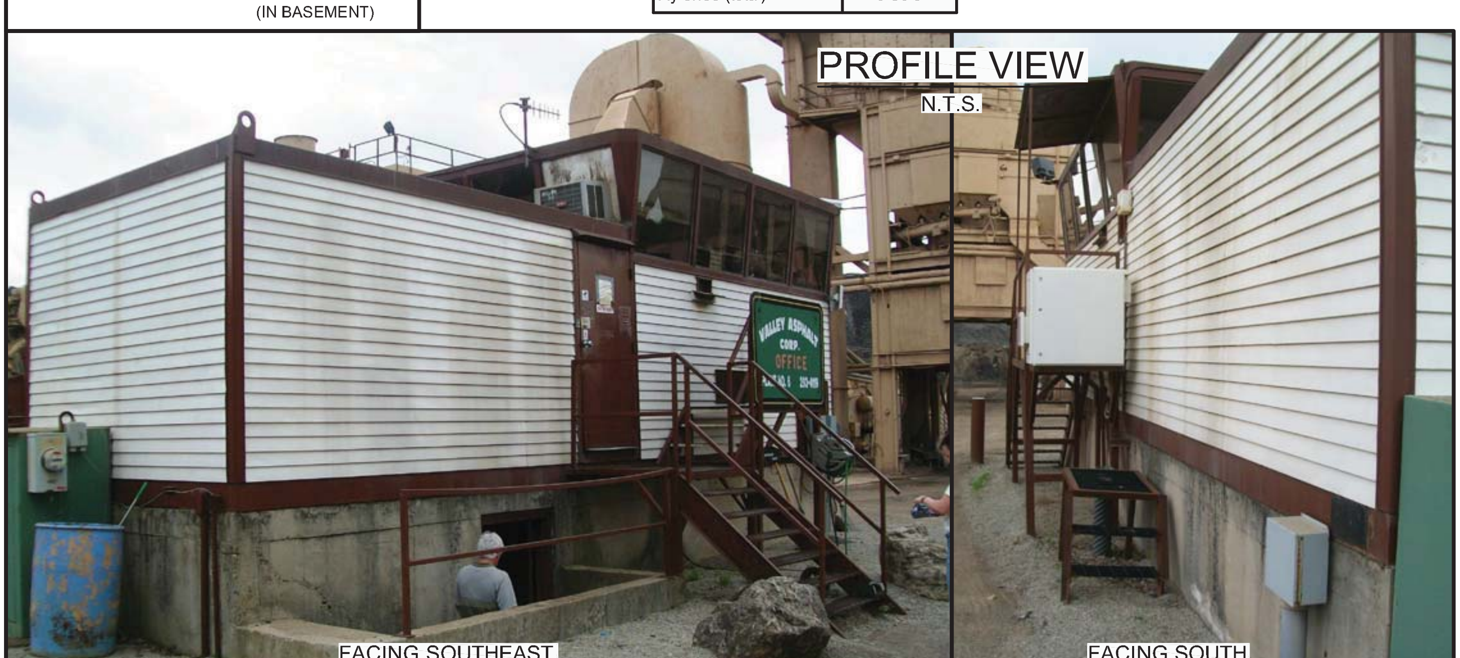
GP01-09	9/18/2009 3-4 ft BGS %	9/29/2009 3-4 ft BGS ug/m3	10/14/2009 3-4 ft BGS %	12/10/2009 3-4 ft BGS %
Benzene	-	860	-	-
Chlorobenzene	-	12000	-	-
cis-1,2-Dichloroethene	-	52 J	-	-
Ethylbenzene	-	1100	-	-
Methane	28.1	-	28.4	23.2
Vinyl chloride	-	760	-	-
Xylenes (total)	-	160	-	-

MW-217	1/12/2010 45-50 ft BGS ug/L
1,1,1-Trichloroethane	0.26 J
cis-1,2-Dichloroethene	1.5
Trichloroethene	2.1
Xylenes (total)	0.43 J

VAS-2	1/8/2009 45-50 ft BGS ug/L
1,1,1-Trichloroethane	0.49 J
Benzene	0.54 J
cis-1,2-Dichloroethene	2.2
Ethylbenzene	0.24 J
Toluene	1.0
Trichloroethene	6.0
Xylenes (total)	0.59 J

TT-7	10/7/2008 6- ft BGS mg/kg	10/7/2008 16- ft BGS mg/kg
Benzene	-	0.094 J
Chlorobenzene	47	-
cis-1,2-Dichloroethene	-	0.02 J
Ethylbenzene	0.22 J	-
Methylene chloride	-	0.19 J
Naphthalene	0.27	-
Toluene	-	0.033 J
Trichloroethene	-	0.24 J
Xylenes (total)	0.71 J	-

PROFILE VIEW
N.T.S.



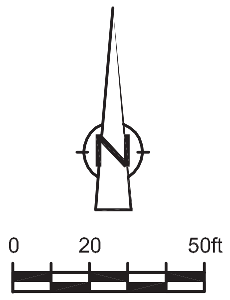
Building Characteristics:
Split-level, pre-fabricated building on top of poured concrete basement (half below grade). Industrial use, constructed prior to 1993. Footprint is 280 sq. ft. Basement is unfinished, paint storage on shelves. Office space on main level has electric baseboard heat and a window A/C unit with average air tightness. One man door to the basement (sometimes left open) and one to the main level. Occupied during weekday work hours by 2 adult workers.

figure 19

PARCEL 5054 - VALLEY ASPHALT PLANT BUILDING 4
1901 DRYDEN ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA017 AUG 08/2011



LEGEND

- APPROXIMATE SITE BOUNDARY
- EDGE OF WATER
- PARCEL BOUNDARY
- VAPOR INTRUSION STUDY BUILDING LOCATION
- MW-202 — MONITORING WELL LOCATION
- BH01-09 — SOIL BORING LOCATION
- VAS01 — VAS SAMPLING LOCATION
- GP21-09, GP04-09 — SOIL VAPOR PROBE LOCATION
- TP1 — TEST PIT LOCATION
- TT1 — TEST TRENCH LOCATION
- PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
- PROPOSED INDOOR AIR SAMPLE LOCATION
- PROPOSED CRAWL SPACE AIR SAMPLE LOCATION
- CONTINGENCY INDOOR AIR SAMPLE LOCATION

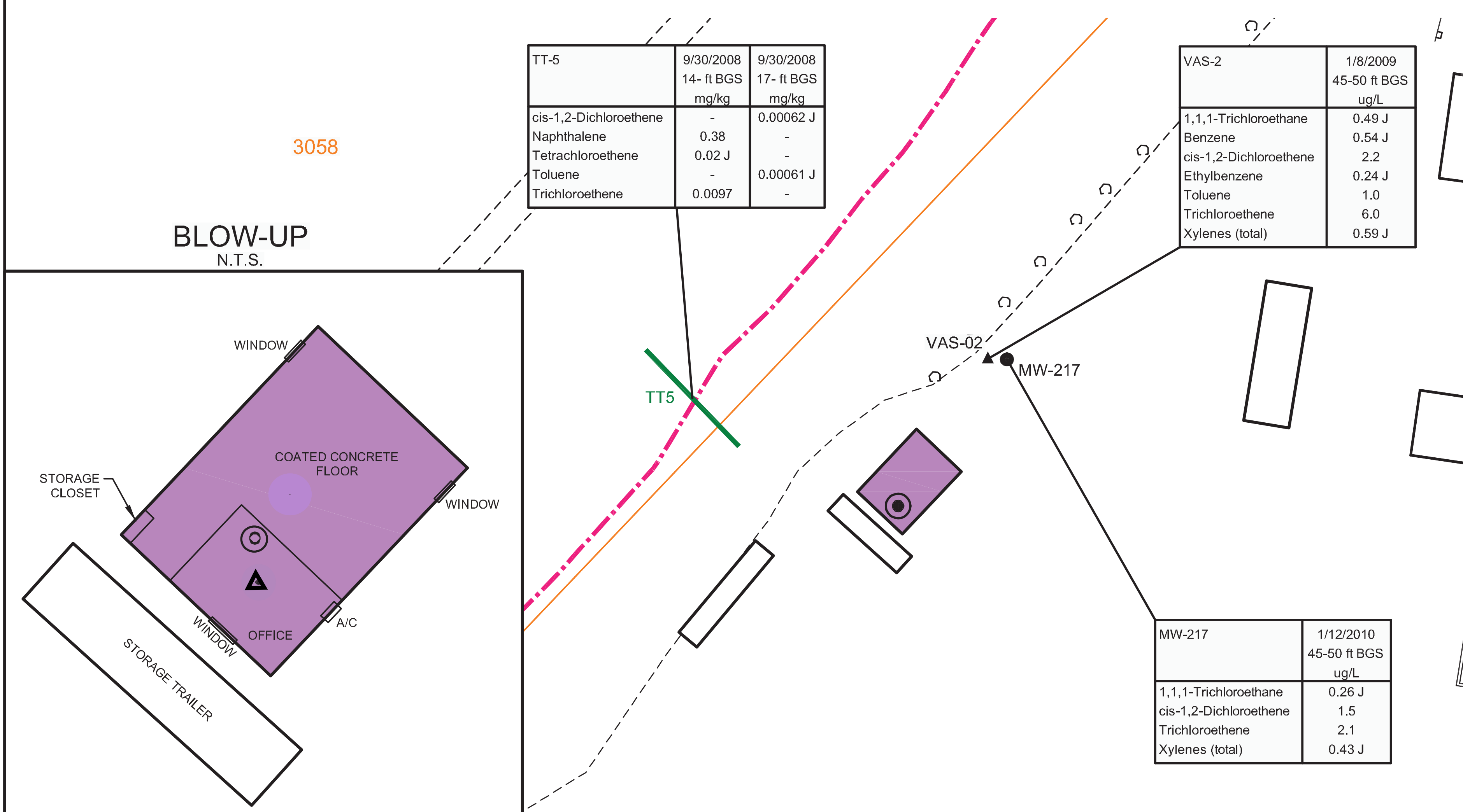
GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

SAMPLE ID; SAMPLE DATE; SAMPLE DEPTH; SAMPLE UNITS; CONCENTRATION VALUE; COMPOUND; EXCEEDANCES

SOIL VAPOR SCREENING LEVELS (ug/m3)	
CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTE: THERE IS ANOTHER SOIL VAPOR SAMPLE LOCATED NEARBY (GP01-09). SEE FIGURE 3.

NOTES:
Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.



TT-5	9/30/2008 14- ft BGS mg/kg	9/30/2008 17- ft BGS mg/kg
cis-1,2-Dichloroethene	-	0.00062 J
Naphthalene	0.38	-
Tetrachloroethene	0.02 J	-
Toluene	-	0.00061 J
Trichloroethene	0.0097	-

VAS-2	1/8/2009 45-50 ft BGS ug/L
1,1,1-Trichloroethane	0.49 J
Benzene	0.54 J
cis-1,2-Dichloroethene	2.2
Ethylbenzene	0.24 J
Toluene	1.0
Trichloroethene	6.0
Xylenes (total)	0.59 J

MW-217	1/12/2010 45-50 ft BGS ug/L
1,1,1-Trichloroethane	0.26 J
cis-1,2-Dichloroethene	1.5
Trichloroethene	2.1
Xylenes (total)	0.43 J

PROFILE VIEW
N.T.S.

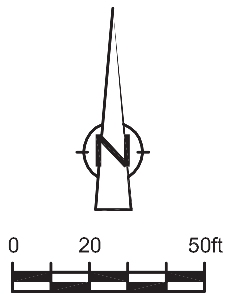
Building Characteristics:
Single-story, industrial use building with steel cladding. Footprint is 594 sq. ft. Approximately 8 ft high ceilings, inoperable windows. The building contains a testing laboratory and a small office. Building was constructed prior to 1968 (originally located near Building 1), then moved to its current location prior to 1993. Concrete slab-on-grade, freshly epoxy coated floor with some thin cracks. Average air tightness with weather seals in fair condition. Heating provided by forced air natural gas furnace. Window A/C units in laboratory and office. Exterior openings - vents, fans, and one man door. Occupied during weekday work hours by 1 adult worker (office) and variable but rare occupancy by 4 adult workers (laboratory).

figure 20

PARCEL 5054 - VALLEY ASPHALT PLANT BUILDING 5
1901 DRYDEN ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA018 AUG 08/2011



LEGEND

APPROXIMATE SITE BOUNDARY
EDGE OF WATER
PARCEL BOUNDARY
VAPOR INTRUSION STUDY BUILDING LOCATION
MW-202 MONITORING WELL LOCATION
BH01-09 SOIL BORING LOCATION
VAS01 VAS SAMPLING LOCATION
GP21-09 / GP04-09 SOIL VAPOR PROBE LOCATION
TP1 TEST PIT LOCATION
TT1 TEST TRENCH LOCATION
PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
PROPOSED INDOOR AIR SAMPLE LOCATION
PROPOSED CRAWL SPACE AIR SAMPLE LOCATION

GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

SAMPLE ID
SAMPLE DATE
SAMPLE DEPTH
SAMPLE UNITS
CONCENTRATION VALUE
COMPOUND
EXCEEDANCES

SOIL VAPOR SCREENING LEVELS (ug/m3)

CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTES:
Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.

TP-6	10/6/2008 20- ft BGS mg/kg
Benzene	0.00036 J
cis-1,2-Dichloroethene	0.0017 J
Toluene	0.00028 J
trans-1,2-Dichloroethene	0.00053 J
Trichloroethene	0.00068 J
Vinyl chloride	0.00058 J
Xylenes (total)	0.0011 J

TT-7	10/7/2008 6- ft BGS mg/kg	10/7/2008 16- ft BGS mg/kg
Benzene	-	0.094 J
Chlorobenzene	47	-
cis-1,2-Dichloroethene	-	0.02 J
Ethylbenzene	0.22 J	-
Methylene chloride	-	0.19 J
Naphthalene	0.27	-
Toluene	-	0.033 J
Trichloroethene	-	0.24 J
Xylenes (total)	0.71 J	-

GP01-09	9/18/2009 3-4 ft BGS %	9/29/2009 3-4 ft BGS ug/m3	10/14/2009 3-4 ft BGS %	12/10/2009 3-4 ft BGS %
Benzene	-	860	-	-
Chlorobenzene	-	12000	-	-
cis-1,2-Dichloroethene	-	52 J	-	-
Ethylbenzene	-	1100	-	-
Methane	28.1	-	28.4	23.2
Vinyl chloride	-	760	-	-
Xylenes (total)	-	160	-	-

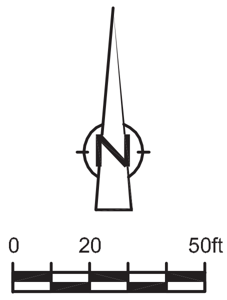
PROFILE VIEW
N.T.S.

Building Characteristics:
Single-story industrial-use building with steel panels. 218 sq. ft. steel-frame, steel-sided storage shed with earthen floor, constructed prior to 2005. No insulation, not air tight. No HVAC systems present. Exterior openings - vents and personnel door. Building used for chemical storage.
No regular occupancy, storage only

figure 21
PARCEL 5054 - VALLEY ASPHALT PLANT BUILDING 6
1901 DRYDEN ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA019 AUG 08/2011



LEGEND

- APPROXIMATE SITE BOUNDARY
- EDGE OF WATER
- PARCEL BOUNDARY
- VAPOR INTRUSION STUDY BUILDING LOCATION
- MW-202 — MONITORING WELL LOCATION
- BH01-09 — SOIL BORING LOCATION
- VAS01 — VAS SAMPLING LOCATION
- GP21-09, GP04-09 — SOIL VAPOR PROBE LOCATION
- TP1 — TEST PIT LOCATION
- TT1 — TEST TRENCH LOCATION
- PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
- PROPOSED INDOOR AIR SAMPLE LOCATION
- PROPOSED CRAWL SPACE AIR SAMPLE LOCATION

GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

- SAMPLE ID
- SAMPLE DATE
- SAMPLE DEPTH
- SAMPLE UNITS
- CONCENTRATION VALUE
- COMPOUND
- EXCEEDANCES

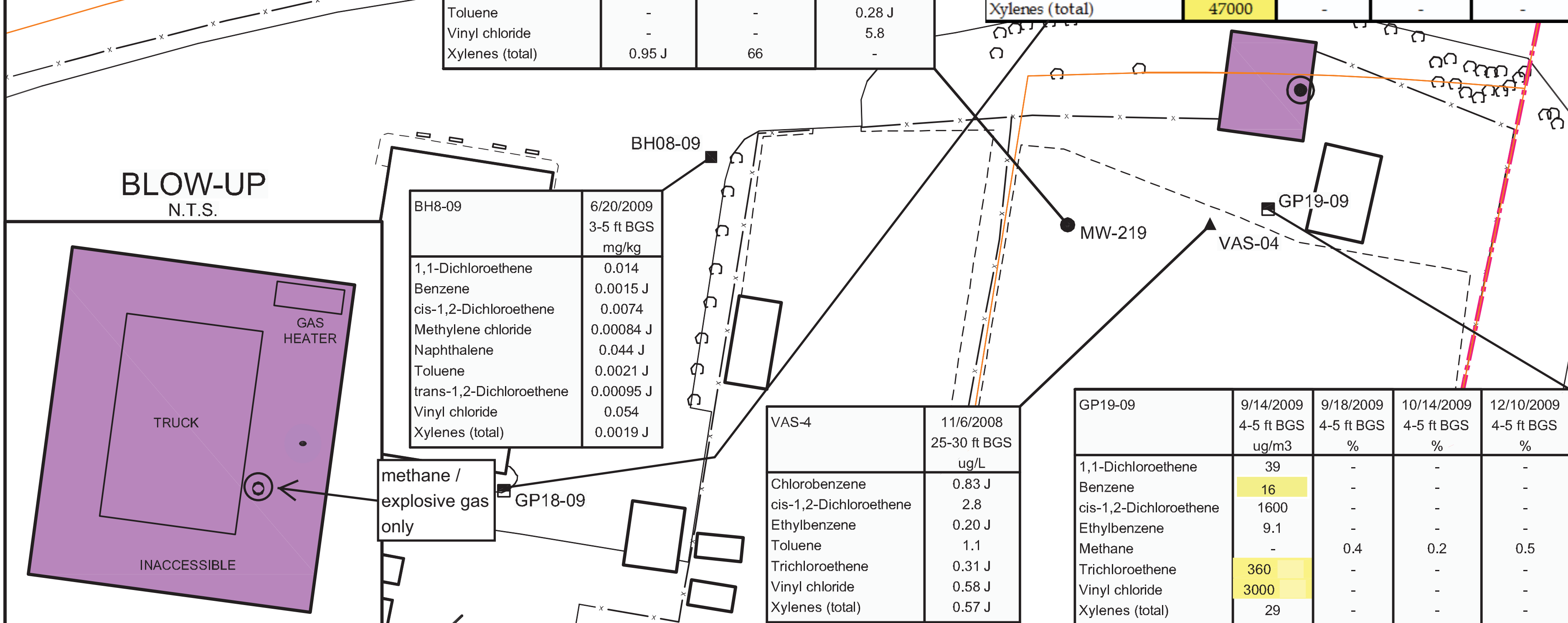
SOIL VAPOR SCREENING LEVELS (ug/m3)

CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTES:
Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.

GP18-09	9/11/2009 3-4 ft BGS ug/m3	9/18/2009 3-4 ft BGS %	10/14/2009 3-4 ft BGS %	12/10/2009 3-4 ft BGS %
1,1-Dichloroethane	400 J	-	-	-
Benzene	14000	-	-	-
cis-1,2-Dichloroethene	340 J	-	-	-
Ethylbenzene	48000	-	-	-
Methane	-	26.6	23.1	20.6
Naphthalene	980 J	-	-	-
Vinyl chloride	4800	-	-	-
Xylenes (total)	47000	-	-	-

MW-219	12/4/2009 24-26 ft BGS mg/kg	1/12/2010 22.0-32.0 ft BGS ug/L	4/14/2010 22.0-32.0 ft BGS ug/L
Benzene	-	18	-
Chlorobenzene	0.051 J	6.2	-
cis-1,2-Dichloroethene	-	-	4.8
Ethylbenzene	0.044 J	3.9 J	-
Naphthalene	0.6	-	-
Toluene	-	-	0.28 J
Vinyl chloride	-	-	5.8
Xylenes (total)	0.95 J	66	-



BH8-09	6/20/2009 3-5 ft BGS mg/kg
1,1-Dichloroethene	0.014
Benzene	0.0015 J
cis-1,2-Dichloroethene	0.0074
Methylene chloride	0.00084 J
Naphthalene	0.044 J
Toluene	0.0021 J
trans-1,2-Dichloroethene	0.00095 J
Vinyl chloride	0.054
Xylenes (total)	0.0019 J

VAS-4	11/6/2008 25-30 ft BGS ug/L
Chlorobenzene	0.83 J
cis-1,2-Dichloroethene	2.8
Ethylbenzene	0.20 J
Toluene	1.1
Trichloroethene	0.31 J
Vinyl chloride	0.58 J
Xylenes (total)	0.57 J

GP19-09	9/14/2009 4-5 ft BGS ug/m3	9/18/2009 4-5 ft BGS %	10/14/2009 4-5 ft BGS %	12/10/2009 4-5 ft BGS %
1,1-Dichloroethene	39	-	-	-
Benzene	16	-	-	-
cis-1,2-Dichloroethene	1600	-	-	-
Ethylbenzene	9.1	-	-	-
Methane	-	0.4	0.2	0.5
Trichloroethene	360	-	-	-
Vinyl chloride	3000	-	-	-
Xylenes (total)	29	-	-	-

PROFILE VIEW
N.T.S.

Building Characteristics:
Single-story industrial-use garage and storage building. 822 sq. ft. concrete block constructed prior to 1968. Not able to inspect interior at time of building surveys. Heating provided by forced air natural gas wall-mounted heater.
Exterior openings - vents, wall openings, utility pipe penetrations, and apparently inoperable bay door with broken panels.
Occupancy - unknown, building use appears to be for storage only.

figure 22

PARCEL 5054 - BUILDING 7
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

CRA

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA020 AUG 08/2011

LEGEND

- APPROXIMATE SITE BOUNDARY
- EDGE OF WATER
- PARCEL BOUNDARY
- VAPOR INTRUSION STUDY BUILDING LOCATION
- MW-202 — MONITORING WELL LOCATION
- BH01-09 — SOIL BORING LOCATION
- VAS01 — VAS SAMPLING LOCATION
- GP21-09, GP04-09 — SOIL VAPOR PROBE LOCATION
- TP1 — TEST PIT LOCATION
- TT1 — TEST TRENCH LOCATION
- PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
- PROPOSED INDOOR AIR SAMPLE LOCATION
- PROPOSED CRAWL SPACE AIR SAMPLE LOCATION
- CONTINGENCY INDOOR AIR SAMPLE LOCATION

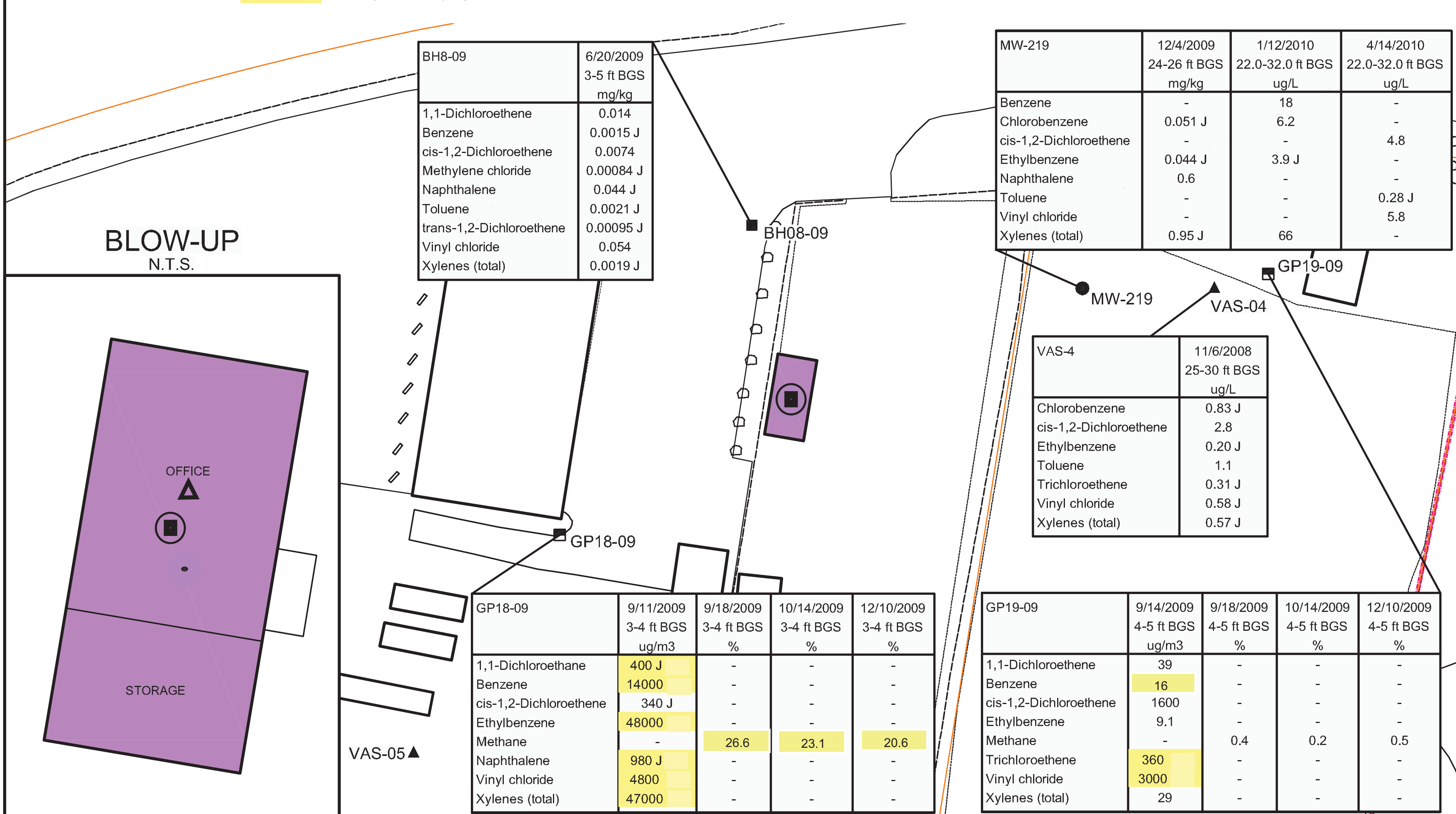
0 20 50ft

GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

SAMPLE DATE
SAMPLE DEPTH
SAMPLE UNITS
CONCENTRATION VALUE
COMPOUND
SAMPLE ID
EXCEEDANCES

SOIL VAPOR SCREENING LEVELS (ug/m3)	
CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTES:
Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.



BH8-09	6/20/2009 3-5 ft BGS mg/kg
1,1-Dichloroethene	0.014
Benzene	0.0015 J
cis-1,2-Dichloroethene	0.0074
Methylene chloride	0.00084 J
Naphthalene	0.044 J
Toluene	0.0021 J
trans-1,2-Dichloroethene	0.00095 J
Vinyl chloride	0.054
Xylenes (total)	0.0019 J

MW-219	12/4/2009 24-26 ft BGS mg/kg	1/12/2010 22.0-32.0 ft BGS ug/L	4/14/2010 22.0-32.0 ft BGS ug/L
Benzene	-	18	-
Chlorobenzene	0.051 J	6.2	-
cis-1,2-Dichloroethene	-	-	4.8
Ethylbenzene	0.044 J	3.9 J	-
Naphthalene	0.6	-	-
Toluene	-	-	0.28 J
Vinyl chloride	-	-	5.8
Xylenes (total)	0.95 J	66	-

VAS-4	11/6/2008 25-30 ft BGS ug/L
Chlorobenzene	0.83 J
cis-1,2-Dichloroethene	2.8
Ethylbenzene	0.20 J
Toluene	1.1
Trichloroethene	0.31 J
Vinyl chloride	0.58 J
Xylenes (total)	0.57 J

GP18-09	9/11/2009 3-4 ft BGS ug/m3	9/18/2009 3-4 ft BGS %	10/14/2009 3-4 ft BGS %	12/10/2009 3-4 ft BGS %
1,1-Dichloroethane	400 J	-	-	-
Benzene	14000	-	-	-
cis-1,2-Dichloroethene	340 J	-	-	-
Ethylbenzene	48000	-	-	-
Methane	-	26.6	23.1	20.6
Naphthalene	980 J	-	-	-
Vinyl chloride	4800	-	-	-
Xylenes (total)	47000	-	-	-

GP19-09	9/14/2009 4-5 ft BGS ug/m3	9/18/2009 4-5 ft BGS %	10/14/2009 4-5 ft BGS %	12/10/2009 4-5 ft BGS %
1,1-Dichloroethene	39	-	-	-
Benzene	16	-	-	-
cis-1,2-Dichloroethene	1600	-	-	-
Ethylbenzene	9.1	-	-	-
Methane	-	0.4	0.2	0.5
Trichloroethene	360	-	-	-
Vinyl chloride	3000	-	-	-
Xylenes (total)	29	-	-	-

PROFILE VIEW
N.T.S.

Building Characteristics:
Single-story commercial-use building. 365 sq. ft building on raised foundation, with wood siding, constructed prior to 1950s. No weather seals present, not air tight. Exterior openings - windows, door. No HVAC systems present.
Occupancy - vacant since July 1, 2011.

figure 23

PARCEL 5054 - MURPHY'S PLUMBING BUILDING MP
1927 DRYDEN ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

CRA

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA021 AUG 09/2011

LEGEND

APPROXIMATE SITE BOUNDARY
EDGE OF WATER
PARCEL BOUNDARY
VAPOR INTRUSION STUDY BUILDING LOCATION
MW-202 MONITORING WELL LOCATION
BH01-09 SOIL BORING LOCATION
VAS01 VAS SAMPLING LOCATION
GP21-09, GP04-09 SOIL VAPOR PROBE LOCATION
TP1 TEST PIT LOCATION
TT1 TEST TRENCH LOCATION
PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
PROPOSED INDOOR AIR SAMPLE LOCATION
PROPOSED CRAWL SPACE AIR SAMPLE LOCATION
CONTINGENCY INDOOR AIR SAMPLE LOCATION

0 20 60ft

GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

SAMPLE DATE
SAMPLE DEPTH
SAMPLE UNITS
CONCENTRATION VALUE
COMPOUND
SAMPLE ID
EXCEEDANCES

SOIL VAPOR SCREENING LEVELS (ug/m3)

CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400

METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%

NOTES:

Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.

VAS-7	12/18/2008 40-45 ft BGS ug/L	12/19/2008 50-55 ft BGS ug/L	12/19/2008 55-60 ft BGS ug/L
cis-1,2-Dichloroethene	-	11	-
Toluene	-	-	0.68 J
trans-1,2-Dichloroethene	0.33 J	-	-
Trichloroethene	-	-	1.3
Vinyl chloride	2.0	-	-

VAS-14	11/16/2008 25-30 ft BGS ug/L	11/16/2008 30-35 ft BGS ug/L	11/16/2008 35-40 ft BGS ug/L	11/16/2008 45-50 ft BGS ug/L	11/16/2008 50-55 ft BGS ug/L
1,1,1-Trichloroethane	0.26 J	-	-	-	-
Benzene	-	-	-	0.44 J	-
Chloroform (Trichloromethane)	0.76 J	-	-	-	-
cis-1,2-Dichloroethene	-	-	-	9.9	-
Ethylbenzene	-	-	-	0.23 J	-
Tetrachloroethene	-	0.46 J	-	-	-
Toluene	-	-	-	0.97 J	-
trans-1,2-Dichloroethene	-	-	-	0.53 J	-
Trichloroethene	-	-	-	-	3.0
Vinyl chloride	-	-	-	-	0.27 J
Xylenes (total)	-	-	0.50 J	-	-

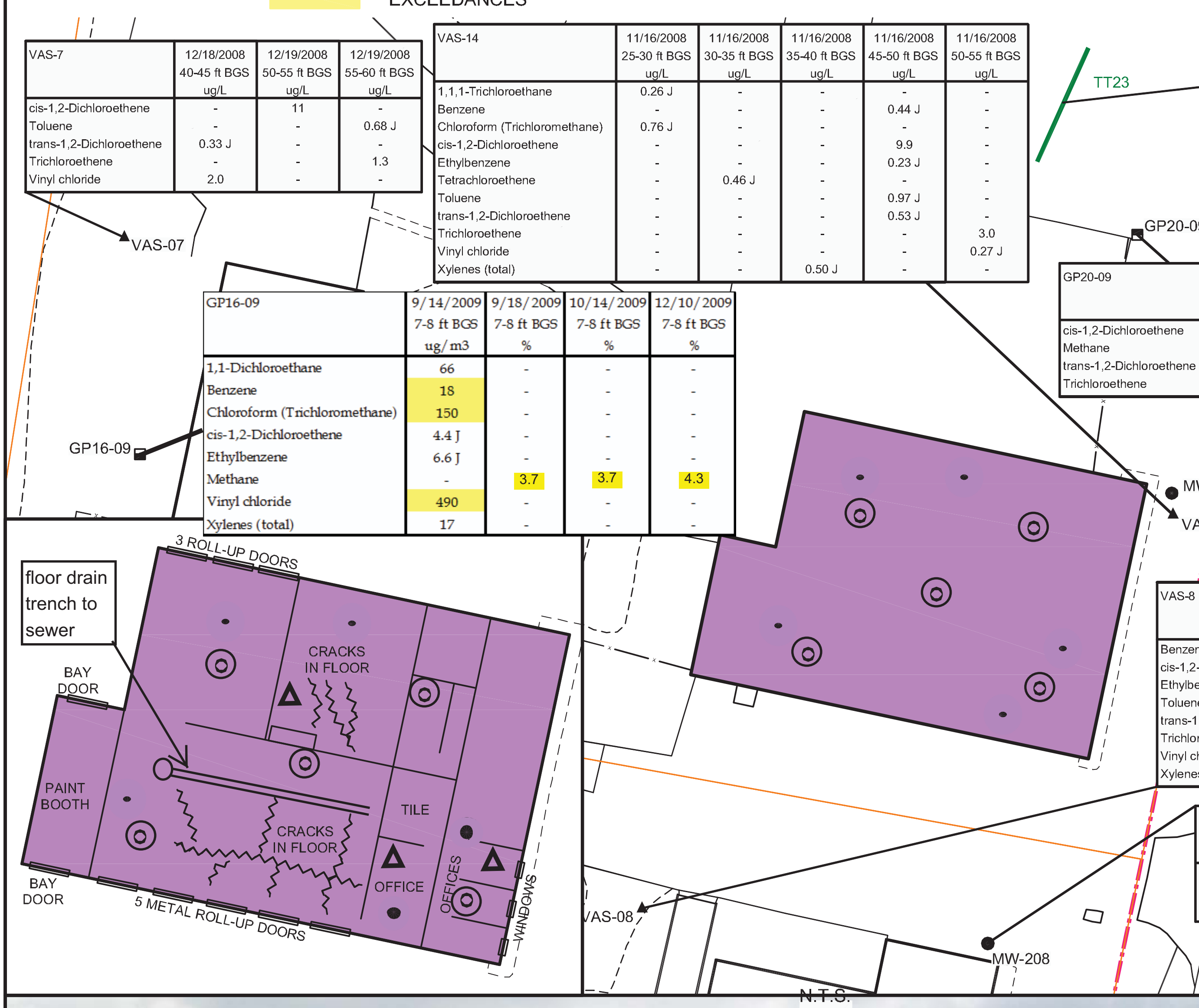
TT-23	10/6/2008 7- ft BGS mg/kg	10/6/2008 18- ft BGS mg/kg
cis-1,2-Dichloroethene	0.016	-
Trichloroethene	0.031	-
Xylenes (total)	-	0.0012 J

GP16-09	9/14/2009 7-8 ft BGS ug/m3	9/18/2009 7-8 ft BGS %	10/14/2009 7-8 ft BGS %	12/10/2009 7-8 ft BGS %
1,1-Dichloroethane	66	-	-	-
Benzene	18	-	-	-
Chloroform (Trichloromethane)	150	-	-	-
cis-1,2-Dichloroethene	4.4 J	-	-	-
Ethylbenzene	6.6 J	-	-	-
Methane	-	3.7	3.7	4.3
Vinyl chloride	490	-	-	-
Xylenes (total)	17	-	-	-

GP20-09	9/14/2009 4-5 ft BGS ug/m3	9/18/2009 4-5 ft BGS %	10/14/2009 4-5 ft BGS %	12/10/2009 4-5 ft BGS %	1/29/2010 4-5 ft BGS ug/m3
cis-1,2-Dichloroethene	16000	-	-	-	4500 / 4600
Methane	-	0	0	0	-
trans-1,2-Dichloroethene	310 J	-	-	-	-
Trichloroethene	56000	-	-	-	16000 /16000

VAS-8	1/8/2009 25-30 ft BGS ug/L	1/8/2009 32-37 ft BGS ug/L	1/10/2009 37-42 ft BGS ug/L	1/10/2009 47-52 ft BGS ug/L
Benzene	-	-	-	0.86 J
cis-1,2-Dichloroethene	-	74	-	-
Ethylbenzene	0.25 J	-	-	-
Toluene	2.0	-	-	-
trans-1,2-Dichloroethene	-	0.83 J	-	-
Trichloroethene	-	51	51	-
Vinyl chloride	-	3.4	-	-
Xylenes (total)	0.52 J	-	-	-

MW-208	9/5/2008 32.0-42.0 ft BGS ug/L
Chloroform (Trichloromethane)	0.23 J
cis-1,2-Dichloroethene	0.76 J
Trichloroethene	1.0



PROF VIEW

Building Characteristics:
Commercial-use building, constructed prior to 1968. Building divided into two sections. Total footprint is 13,700 sq. ft. Exterior openings - vents, fans, utility pipe penetrations, windows, 10 large bay doors, man doors. Occupied weekdays from 7 AM to 5 PM by 7 adult workers.
Eastern 1/4 of the building is brick, two story, office space, concrete slab-on-grade with wall-to-wall carpet. Average air tightness. Heating provided by forced air natural gas furnace, central A/C. Paint storage room in northeast corner, strong paint odor. Southern 3/4 of the building is one story, concrete block with bare concrete floor. Repair shop for large trucks with shop office on east side (tile floor and 8 ft drop ceiling). Floor is visibly cracked in areas, floor drain present (leading to sewer) and evidence of spills throughout the shop. Flat metal roof approximately 24 ft high. Not air tight, no weather seals present, bay doors kep open when occupied. Radiant overhead heat and used oil stove, no A/C. Strong paint odors in west side paint booth area.

figure 24

PARCEL 5171 - B&G TRUCKING BUILDING 1
1951 DRYDEN ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

CRA

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA022 AUG 09/2011

LEGEND

APPROXIMATE SITE BOUNDARY
EDGE OF WATER
PARCEL BOUNDARY
VAPOR INTRUSION STUDY BUILDING LOCATION
MW-202 MONITORING WELL LOCATION
BH01-09 SOIL BORING LOCATION
VAS01 VAS SAMPLING LOCATION
GP21-09 / GP04-09 SOIL VAPOR PROBE LOCATION
TP1 TEST PIT LOCATION
TT1 TEST TRENCH LOCATION
PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
PROPOSED INDOOR AIR SAMPLE LOCATION
PROPOSED CRAWL SPACE AIR SAMPLE LOCATION
CONTINGENCY INDOOR AIR SAMPLE LOCATION

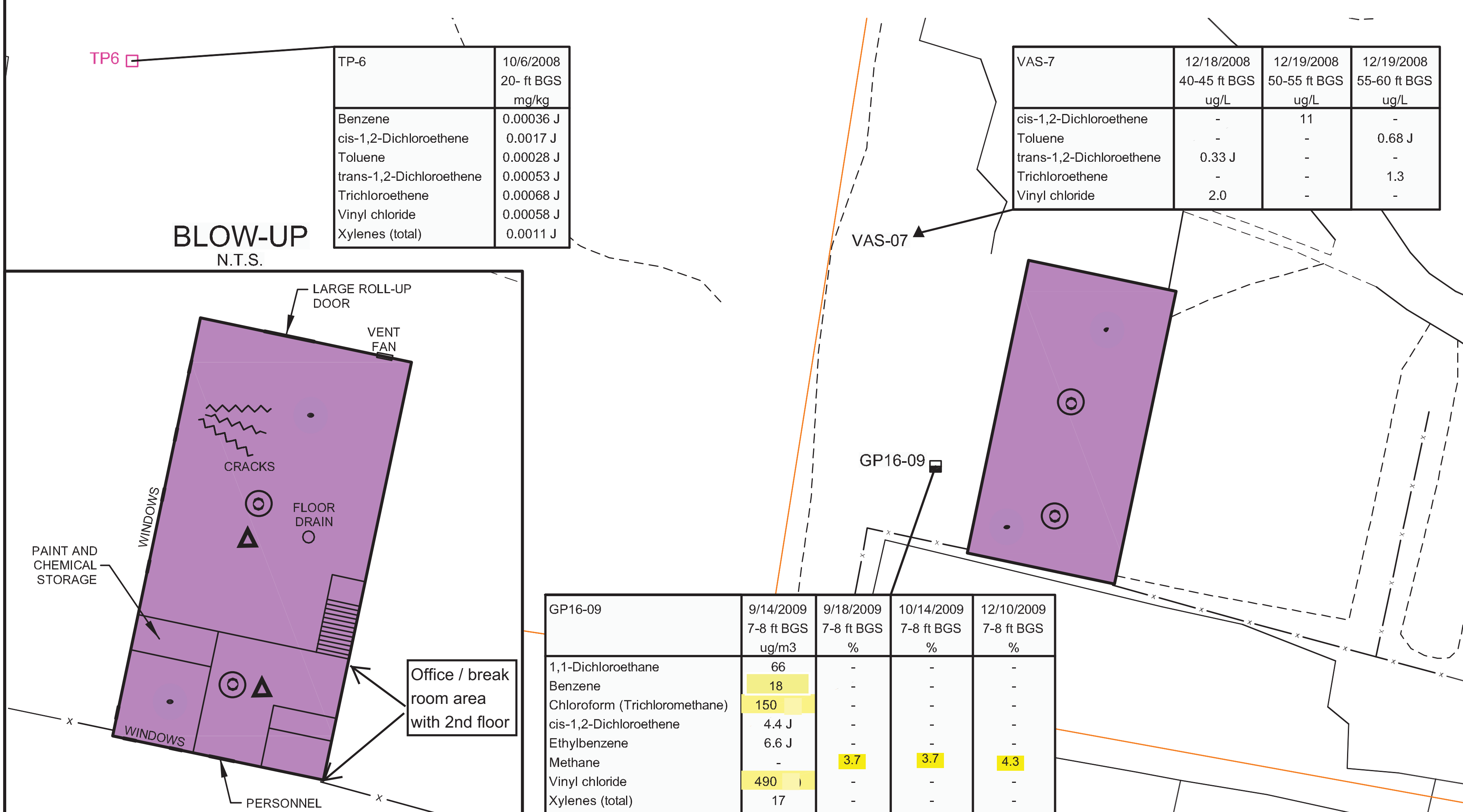
0 20 50ft

GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

SAMPLE DATE
SAMPLE DEPTH
SAMPLE UNITS
CONCENTRATION VALUE
COMPOUND
SAMPLE ID
EXCEEDANCES

SOIL VAPOR SCREENING LEVELS (ug/m3)	
CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTES:
Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.



TP-6	10/6/2008 20- ft BGS mg/kg
Benzene	0.00036 J
cis-1,2-Dichloroethene	0.0017 J
Toluene	0.00028 J
trans-1,2-Dichloroethene	0.00053 J
Trichloroethene	0.00068 J
Vinyl chloride	0.00058 J
Xylenes (total)	0.0011 J

VAS-7	12/18/2008 40-45 ft BGS ug/L	12/19/2008 50-55 ft BGS ug/L	12/19/2008 55-60 ft BGS ug/L
cis-1,2-Dichloroethene	-	11	-
Toluene	-	-	0.68 J
trans-1,2-Dichloroethene	0.33 J	-	-
Trichloroethene	-	-	1.3
Vinyl chloride	2.0	-	-

GP16-09	9/14/2009 7-8 ft BGS ug/m3	9/18/2009 7-8 ft BGS %	10/14/2009 7-8 ft BGS %	12/10/2009 7-8 ft BGS %
1,1-Dichloroethane	66	-	-	-
Benzene	18	-	-	-
Chloroform (Trichloromethane)	150	-	-	-
cis-1,2-Dichloroethene	4.4 J	-	-	-
Ethylbenzene	6.6 J	-	-	-
Methane	-	3.7	3.7	4.3
Vinyl chloride	490	-	-	-
Xylenes (total)	17	-	-	-

PROFILE VIEW
N.T.S.

Building Characteristics:
Commercial-use concrete block building, constructed prior to 1968. Used for large truck repair with office/break room on the south side. Total footprint is 5,000 sq. ft. Slab-on-grade, unsealed poured concrete with some cracks and one large floor drain, with visible staining. One story building, approximately 20 ft high. Southern 1/3 of building has a 2nd story within the building, storage space only. Approximately 8 ft ceilings in 1st and 2nd floor of southern 1/3 of building. Ceiling in the shop area (northern 2/3 of building) is 20 ft high. Heating provided by natural gas. Radiant ceiling heating system and floor fans are present. Not insulated, not air tight, bay door kept open during work hours. Exterior openings - vent fans, utility pipe penetrations, windows, 1 large bay door, man doors. Occupied weekdays from 7 AM to 5 PM by 2 adult workers.

figure 25

PARCEL 5171 - B&G TRUCKING BUILDING 2
1951 DRYDEN ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

CRA

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA023 AUG 09/2011

LEGEND

- APPROXIMATE SITE BOUNDARY
- EDGE OF WATER
- PARCEL BOUNDARY
- VAPOR INTRUSION STUDY BUILDING LOCATION
- MW-202 — MONITORING WELL LOCATION
- BH01-09 — SOIL BORING LOCATION
- VAS01 — VAS SAMPLING LOCATION
- GP21-09, GP04-09 — SOIL VAPOR PROBE LOCATION
- TP1 — TEST PIT LOCATION
- TT1 — TEST TRENCH LOCATION
- PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
- PROPOSED INDOOR AIR SAMPLE LOCATION
- PROPOSED CRAWL SPACE AIR SAMPLE LOCATION

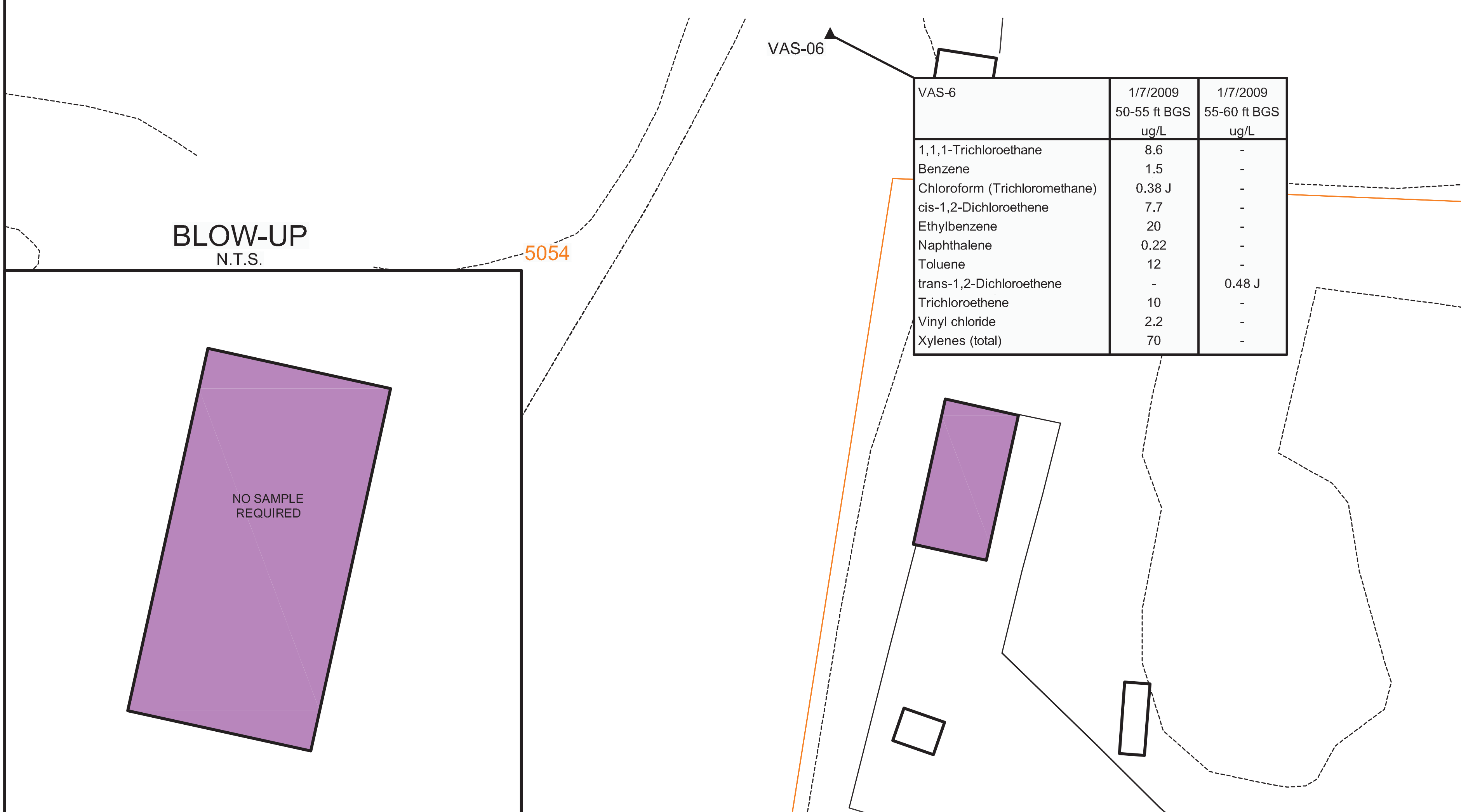
0 20 50ft

GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

SAMPLE ID
SAMPLE DATE
SAMPLE DEPTH
SAMPLE UNITS
CONCENTRATION VALUE
COMPOUND
EXCEEDANCES

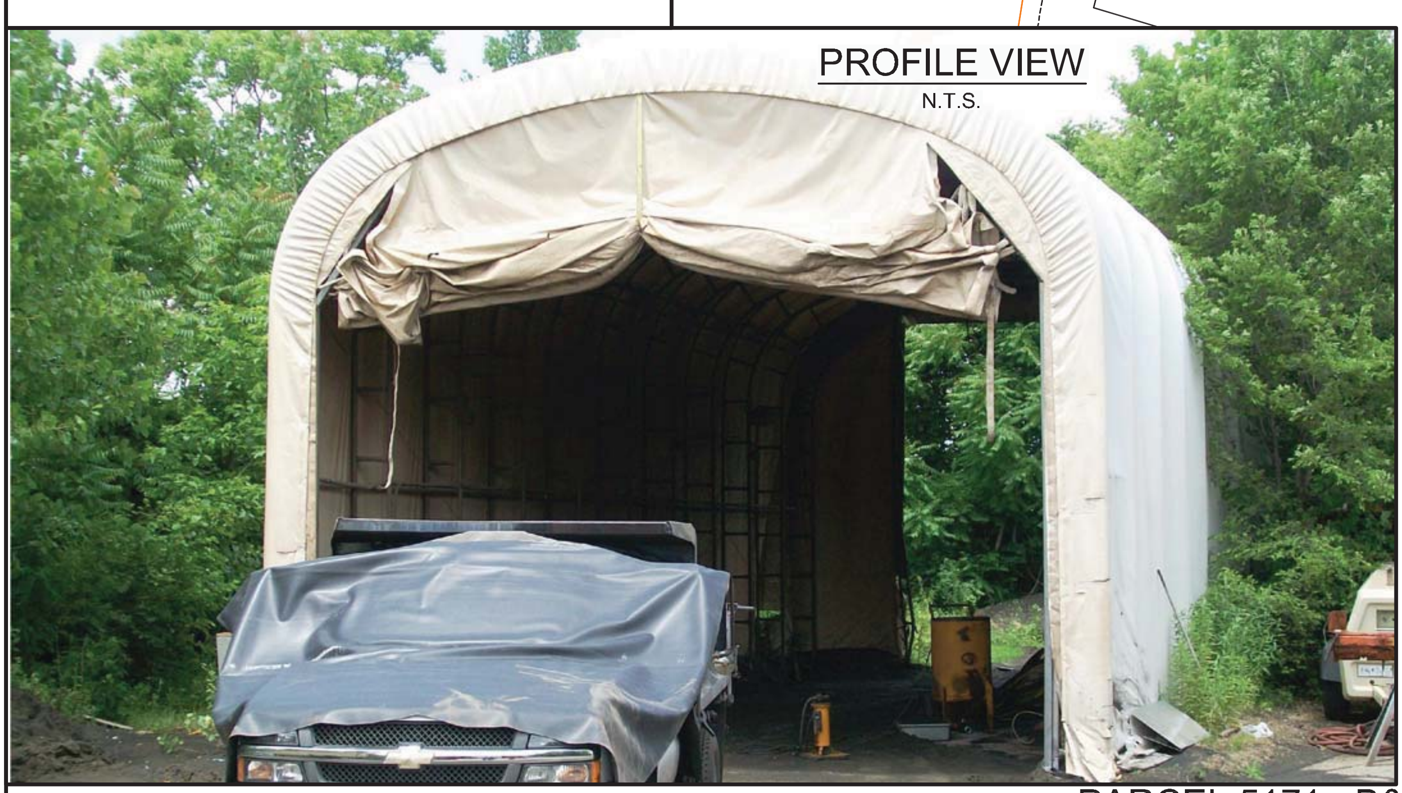
SOIL VAPOR SCREENING LEVELS (ug/m3)	
CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTES:
Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.



VAS-6	1/7/2009 50-55 ft BGS ug/L	1/7/2009 55-60 ft BGS ug/L
1,1,1-Trichloroethane	8.6	-
Benzene	1.5	-
Chloroform (Trichloromethane)	0.38 J	-
cis-1,2-Dichloroethene	7.7	-
Ethylbenzene	20	-
Naphthalene	0.22	-
Toluene	12	-
trans-1,2-Dichloroethene	-	0.48 J
Trichloroethene	10	-
Vinyl chloride	2.2	-
Xylenes (total)	70	-

PROFILE VIEW
N.T.S.



Building Characteristics:
Single-story commercial-use structure, used for sandblasting, erected by 2000. 1,250 sq. ft, structure composed of canvas steel frame, covered with fabric and placed on asphalt, with retractable canvas flaps at both ends. Floor is damp with cracks. No HVAC system present in structure Occupied as needed weekdays from 7 AM to 5 PM

figure 26
PARCEL 5171 - B&G TRUCKING BUILDING 3
1951 DRYDEN ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA024 AUG 09/2011

LEGEND

APPROXIMATE SITE BOUNDARY
EDGE OF WATER
PARCEL BOUNDARY
VAPOR INTRUSION STUDY BUILDING LOCATION
MW-202 MONITORING WELL LOCATION
BH01-09 SOIL BORING LOCATION
VAS01 VAS SAMPLING LOCATION
GP21-09, GP04-09 SOIL VAPOR PROBE LOCATION
TP1 TEST PIT LOCATION
TT1 TEST TRENCH LOCATION
PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
PROPOSED INDOOR AIR SAMPLE LOCATION
PROPOSED CRAWL SPACE AIR SAMPLE LOCATION
CONTINGENCY INDOOR AIR SAMPLE LOCATION

0 20 50ft

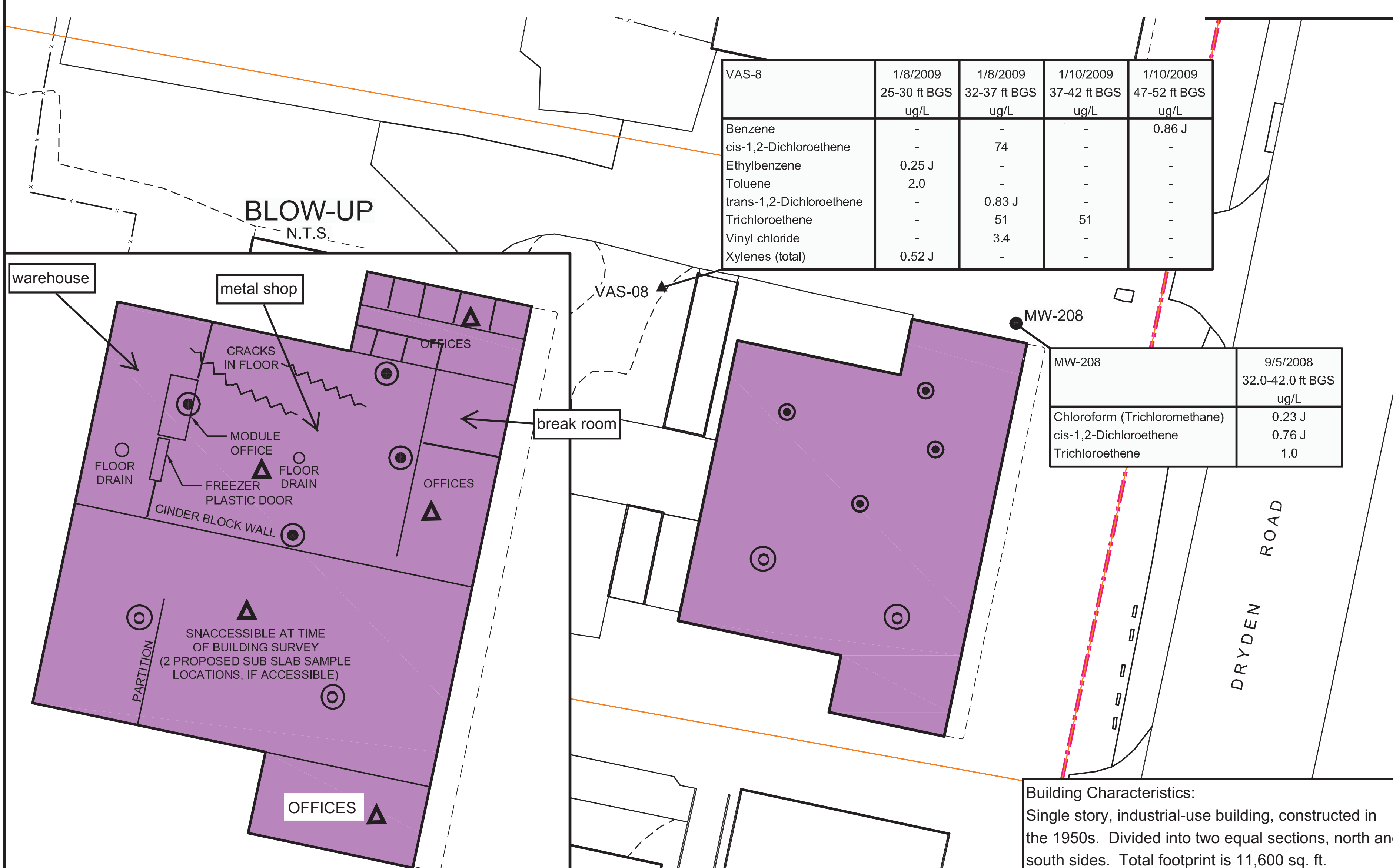
GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

SAMPLE DATE
SAMPLE DEPTH
SAMPLE UNITS
CONCENTRATION VALUE
COMPOUND
SAMPLE ID
EXCEEDANCES

SOIL VAPOR SCREENING LEVELS (ug/m3)	
CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTE: THERE IS ANOTHER SOIL VAPOR SAMPLE LOCATED NEARBY (GP15-09 and GP15-09). SEE FIGURE 3.

NOTES:
Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.



VAS-8	1/8/2009 25-30 ft BGS ug/L	1/8/2009 32-37 ft BGS ug/L	1/10/2009 37-42 ft BGS ug/L	1/10/2009 47-52 ft BGS ug/L
Benzene	-	-	-	0.86 J
cis-1,2-Dichloroethene	-	74	-	-
Ethylbenzene	0.25 J	-	-	-
Toluene	2.0	-	-	-
trans-1,2-Dichloroethene	-	0.83 J	-	-
Trichloroethene	-	51	51	-
Vinyl chloride	-	3.4	-	-
Xylenes (total)	0.52 J	-	-	-

MW-208	9/5/2008 32.0-42.0 ft BGS ug/L
Chloroform (Trichloromethane)	0.23 J
cis-1,2-Dichloroethene	0.76 J
Trichloroethene	1.0

Building Characteristics:
Single story, industrial-use building, constructed in the 1950s. Divided into two equal sections, north and south sides. Total footprint is 11,600 sq. ft. Approximately 16 ft high. Slab-on-grade, concrete block building with brick front. Exterior openings - windows, utility pipe penetrations, bay doors, man doors.
North side is the S&J Precision building. Majority of space is a metal working shop and warehouse with some office space. Bare concrete floor in shop and warehouse with cracks and 2 floor drains, staining on warehouse floor and near drain. North office space has elevated floor with floor tile (possibly asbestos) and wall-to-wall carpet on top. Heating provided by forced air natural gas furnace, central A/C. Not insulated, average air tightness, weather seals in fair condition. Occupied weekdays from 6 AM to 5 PM by 5 adult workers.
South side is the Overstreet Painting building. Not accessible during building survey, looked through window. Appeared vacant. Bare concrete floor. South office area appears similar to north office area.

PROFILE VIEW
N.T.S.

figure 27
PARCEL 5172 - S&J PRECISION BUILDING 1
2015 AND 2019 DRYDEN ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

CRA

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L012006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA025 AUG 09/2011

LEGEND

- APPROXIMATE SITE BOUNDARY
- EDGE OF WATER
- PARCEL BOUNDARY
- VAPOR INTRUSION STUDY BUILDING LOCATION
- MW-202 MONITORING WELL LOCATION
- BH01-09 SOIL BORING LOCATION
- VAS01 VAS SAMPLING LOCATION
- GP21-09, GP04-09 SOIL VAPOR PROBE LOCATION
- TP1 TEST PIT LOCATION
- TT1 TEST TRENCH LOCATION
- PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
- PROPOSED INDOOR AIR SAMPLE LOCATION
- PROPOSED CRAWL SPACE AIR SAMPLE LOCATION
- CONTINGENCY INDOOR AIR SAMPLE LOCATION

0 20 50ft

GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

SAMPLE DATE
SAMPLE DEPTH
SAMPLE UNITS
CONCENTRATION VALUE
COMPOUND
SAMPLE ID
EXCEEDANCES

SOIL VAPOR SCREENING LEVELS (ug/m3)

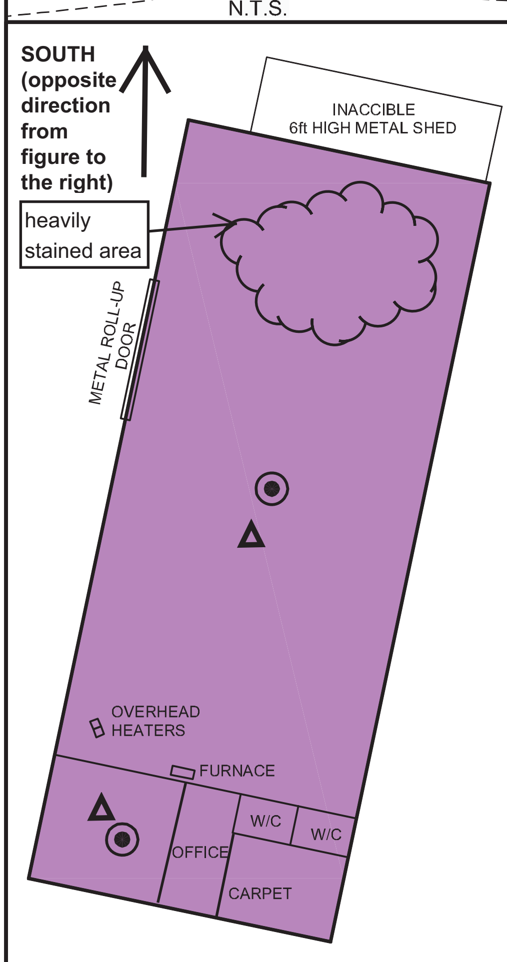
CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400

METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%

NOTES:
Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.

BLOW-UP

N.T.S.

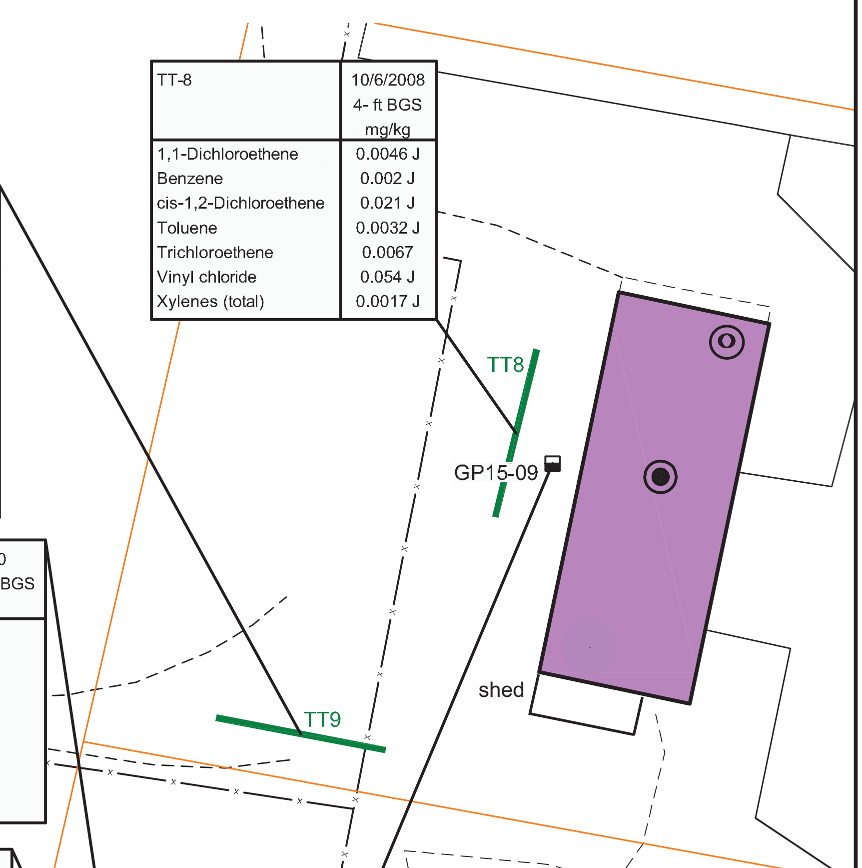


TT-8	10/6/2008 4- ft BGS mg/kg
1,1-Dichloroethene	0.0046 J
Benzene	0.002 J
cis-1,2-Dichloroethene	0.021 J
Toluene	0.0032 J
Trichloroethene	0.0067
Vinyl chloride	0.054 J
Xylenes (total)	0.0017 J

TT-9	10/3/2008 7- ft BGS mg/kg	10/3/2008 17- ft BGS mg/kg	10/3/2008 22- ft BGS mg/kg
Benzene	0.15 J	-	-
Chlorobenzene	4	-	-
cis-1,2-Dichloroethene	0.89	-	-
Ethylbenzene	-	-	66
Methylene chloride	0.26 J	-	-
Naphthalene	-	-	3.9
Toluene	5.3	-	-
Trichloroethene	-	0.67 J	-
Vinyl chloride	0.22 J	-	-
Xylenes (total)	-	-	140

MW-215A	7/24/2009 19.0-29.0 ft BGS ug/L	1/5/2010 19.0-29.0 ft BGS ug/L
Benzene	-	13
Chlorobenzene	4.2	-
cis-1,2-Dichloroethene	-	0.67 J
Ethylbenzene	23	-
Naphthalene	17	-
Toluene	100	-
Vinyl chloride	-	0.40 J
Xylenes (total)	75	-

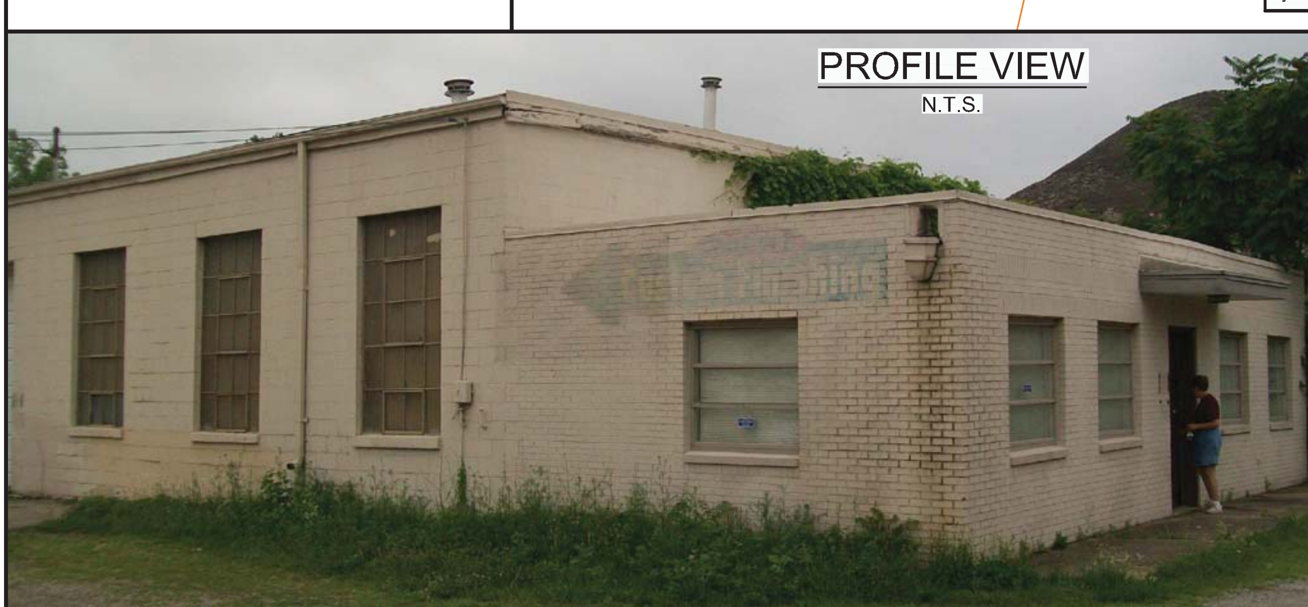
VAS-9	11/18/2008 22-27 ft BGS ug/L	11/18/2008 27-32 ft BGS ug/L	11/18/2008 47-52 ft BGS ug/L
Benzene	0.91 J	-	-
Chlorobenzene	3.6	-	-
cis-1,2-Dichloroethene	-	3900 J	-
Ethylbenzene	0.35 J	-	-
Methylene chloride	-	-	7.5 J
Naphthalene	0.21	-	-
Toluene	-	36 J	-
Trichloroethene	-	5100	-
Vinyl chloride	-	760	-
Xylenes (total)	1.8 J	-	-



GP15-09	9/11/2009 9-10 ft BGS ug/m3	9/18/2009 9-10 ft BGS %	10/14/2009 9-10 ft BGS %	12/10/2009 9-10 ft BGS %
1,1-Dichloroethane	7200	-	-	-
1,1-Dichloroethene	420	-	-	-
Benzene	250	-	-	-
cis-1,2-Dichloroethene	4300	-	-	-
Methane	-	4.8	2	0
trans-1,2-Dichloroethene	210	-	-	-
Trichloroethene	790	-	-	-
Vinyl chloride	14000	-	-	-
Xylenes (total)	18	-	-	-

PROFILE VIEW

N.T.S.



Building Characteristics:
Single-story, slab-on-grade, commercial use building constructed prior to 1959. Recently became vacant, formerly used by A-Evans Filter Service company. Building is divided into two sections. Total footprint is 2,886 sq. ft. Average air tightness. Exterior openings - vents, utility pipe penetrations, office windows, 2 man doors, bay door. Attached metal shed on north side, 6 ft high, not accessible during building survey. Southern 1/5 of the building is brick, approximately 10 ft high with 8 ft high drop ceilings. Formerly used as office space (two separate offices). Heating provided by forced air natural gas furnace, central A/C present. Heating through floor vents, return air through wall vents. Wall-to-wall carpet in offices. Northern 4/5 of the building is concrete block, approximately 15 ft high. Formerly used for grease filter washing and filter storage. Bare concrete floor with area of heavy staining on the north side (former wash area). Not insulated, radiant heat ceiling unit, no A/C.

figure 28

PARCEL 5172 - FORMER A-EVANS AIR FILTER SERVICE BUILDING 2
2003 DRYDEN ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA026 AUG 09/2011

LEGEND

- APPROXIMATE SITE BOUNDARY
- EDGE OF WATER
- PARCEL BOUNDARY
- VAPOR INTRUSION STUDY BUILDING LOCATION
- MW-202 — MONITORING WELL LOCATION
- BH01-09 — SOIL BORING LOCATION
- VAS01 — VAS SAMPLING LOCATION
- GP21-09, GP04-09 — SOIL VAPOR PROBE LOCATION
- TP1 — TEST PIT LOCATION
- TT1 — TEST TRENCH LOCATION
- PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
- PROPOSED INDOOR AIR SAMPLE LOCATION
- PROPOSED CRAWL SPACE AIR SAMPLE LOCATION
- CONTINGENCY INDOOR AIR SAMPLE LOCATION

0 20 50ft

GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

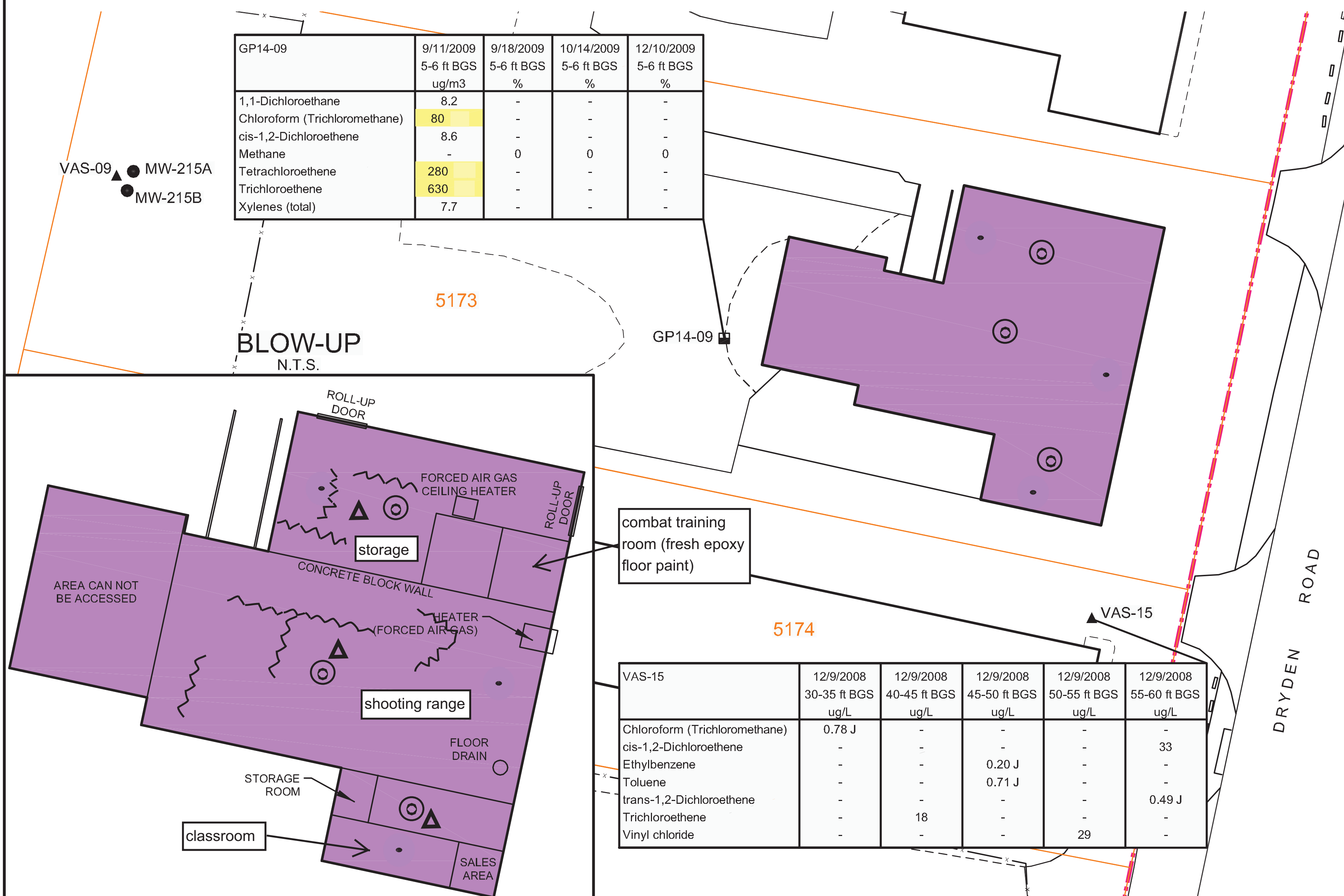
SAMPLE ID — SAMPLE DATE — SAMPLE DEPTH — SAMPLE UNITS — CONCENTRATION VALUE — COMPOUND

EXCEEDANCES

SOIL VAPOR SCREENING LEVELS (ug/m3)	
CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTE: THERE IS ANOTHER SOIL VAPOR SAMPLE LOCATED NEARBY (GP13-09). SEE FIGURE 3.

NOTES:
Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.



GP14-09	9/11/2009 5-6 ft BGS ug/m3	9/18/2009 5-6 ft BGS %	10/14/2009 5-6 ft BGS %	12/10/2009 5-6 ft BGS %
1,1-Dichloroethane	8.2	-	-	-
Chloroform (Trichloromethane)	80	-	-	-
cis-1,2-Dichloroethene	8.6	-	-	-
Methane	-	0	0	0
Tetrachloroethene	280	-	-	-
Trichloroethene	630	-	-	-
Xylenes (total)	7.7	-	-	-

VAS-15	12/9/2008 30-35 ft BGS ug/L	12/9/2008 40-45 ft BGS ug/L	12/9/2008 45-50 ft BGS ug/L	12/9/2008 50-55 ft BGS ug/L	12/9/2008 55-60 ft BGS ug/L
Chloroform (Trichloromethane)	0.78 J	-	-	-	-
cis-1,2-Dichloroethene	-	-	-	-	33
Ethylbenzene	-	-	0.20 J	-	-
Toluene	-	-	0.71 J	-	-
trans-1,2-Dichloroethene	-	-	-	-	0.49 J
Trichloroethene	-	18	-	-	-
Vinyl chloride	-	-	-	29	-

PROFILE VIEW
N.T.S.

Building Characteristics:
Single-story, commercial use building constructed in three stages (north and center portions prior to 1956, western addition prior to 1959, southern addition prior to 1968). Total footprint is 8,250 sq. ft. Concrete block building with brick front. Slab-on-grade, bare concrete or painted concrete, fresh epoxy coat in north side combat training room, large cracks in the shooting range. Heavy staining and oil odor in storage area. Range heated by forced air natural gas ceiling units. Air handling unit pulls air from the range out the roof, operated during business hours. Forced air natural gas heat and central A/C in south section. Exterior openings - vents, fans, windows, 2 bay doors and two man doors. Occupied during business hours by one adult worker (4-hour shifts) and customers.

figure 29
PARCEL 5173 - SIM TRAINER BUILDING 1
2031 DRYDEN ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA027 AUG 09/2011

LEGEND

	APPROXIMATE SITE BOUNDARY
	EDGE OF WATER
	PARCEL BOUNDARY
	VAPOR INTRUSION STUDY BUILDING LOCATION
MW-202	MONITORING WELL LOCATION
BH01-09	SOIL BORING LOCATION
VAS01	VAS SAMPLING LOCATION
GP21-09, GP04-09	SOIL VAPOR PROBE LOCATION
TP1	TEST PIT LOCATION
TT1	TEST TRENCH LOCATION
	PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
	PROPOSED INDOOR AIR SAMPLE LOCATION
	PROPOSED CRAWL SPACE AIR SAMPLE LOCATION
	CONTINGENCY INDOOR AIR SAMPLE LOCATION
	EXCEEDANCES

0 20 50ft

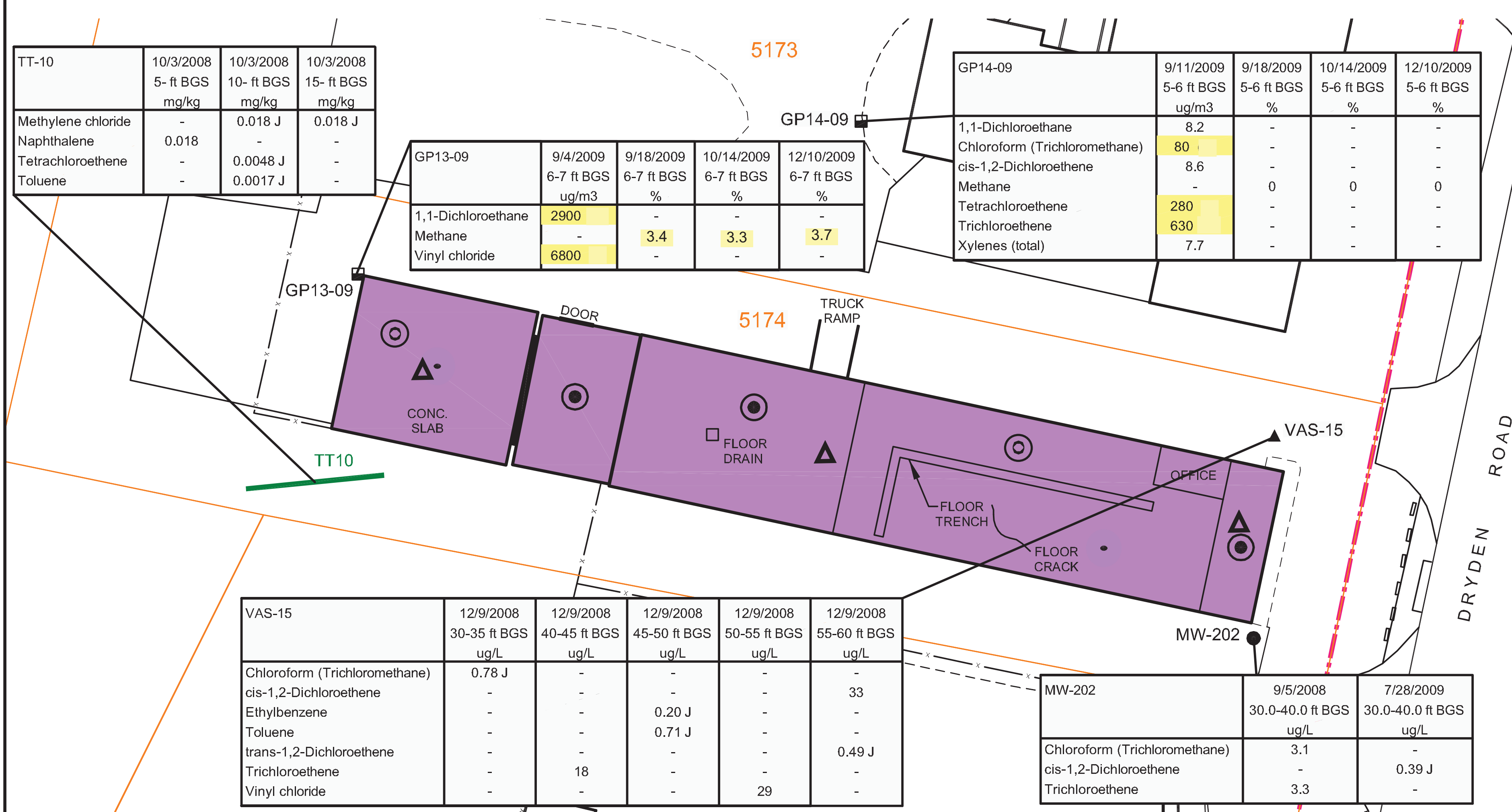
GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

SAMPLE DATE
SAMPLE DEPTH
SAMPLE UNITS
CONCENTRATION VALUE
COMPOUND
SAMPLE ID

SOIL VAPOR SCREENING LEVELS (ug/m3)	
CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTE: THERE IS ANOTHER SOIL VAPOR SAMPLE LOCATED NEARBY (GP12-09). SEE FIGURE 3.

NOTES:
Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.



TT-10	10/3/2008 5- ft BGS mg/kg	10/3/2008 10- ft BGS mg/kg	10/3/2008 15- ft BGS mg/kg
Methylene chloride	-	0.018 J	0.018 J
Naphthalene	0.018	-	-
Tetrachloroethene	-	0.0048 J	-
Toluene	-	0.0017 J	-

GP13-09	9/4/2009 6-7 ft BGS ug/m3	9/18/2009 6-7 ft BGS %	10/14/2009 6-7 ft BGS %	12/10/2009 6-7 ft BGS %
1,1-Dichloroethane	2900	-	-	-
Methane	-	3.4	3.3	3.7
Vinyl chloride	6800	-	-	-

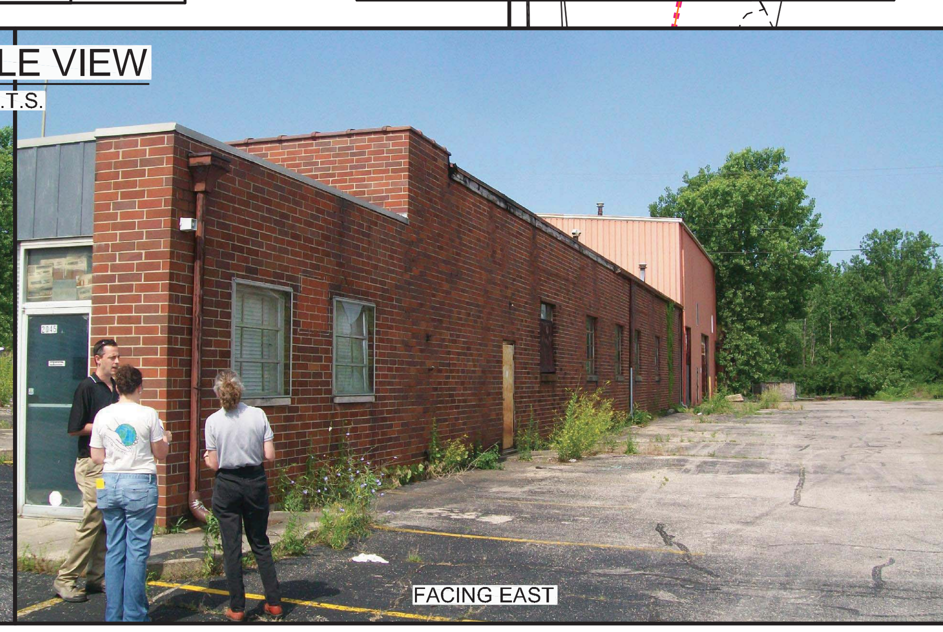
GP14-09	9/11/2009 5-6 ft BGS ug/m3	9/18/2009 5-6 ft BGS %	10/14/2009 5-6 ft BGS %	12/10/2009 5-6 ft BGS %
1,1-Dichloroethane	8.2	-	-	-
Chloroform (Trichloromethane)	80	-	-	-
cis-1,2-Dichloroethene	8.6	-	-	-
Methane	-	0	0	0
Tetrachloroethene	280	-	-	-
Trichloroethene	630	-	-	-
Xylenes (total)	7.7	-	-	-

VAS-15	12/9/2008 30-35 ft BGS ug/L	12/9/2008 40-45 ft BGS ug/L	12/9/2008 45-50 ft BGS ug/L	12/9/2008 50-55 ft BGS ug/L	12/9/2008 55-60 ft BGS ug/L
Chloroform (Trichloromethane)	0.78 J	-	-	-	-
cis-1,2-Dichloroethene	-	-	-	-	33
Ethylbenzene	-	-	0.20 J	-	-
Toluene	-	-	0.71 J	-	-
trans-1,2-Dichloroethene	-	-	-	-	0.49 J
Trichloroethene	-	18	-	-	-
Vinyl chloride	-	-	-	29	-

MW-202	9/5/2008 30.0-40.0 ft BGS ug/L	7/28/2009 30.0-40.0 ft BGS ug/L
Chloroform (Trichloromethane)	3.1	-
cis-1,2-Dichloroethene	-	0.39 J
Trichloroethene	3.3	-

PROFILE VIEW
N.T.S.


FACING SOUTH


FACING EAST

Building Characteristics:
Single-story, commercial-use storage building, constructed prior to 1968. 12,500 sq. ft concrete slab-on-grade building. Areas A (approximately 12 ft high) and B (approximately 16 ft high) constructed with brick, with weather seals in poor condition. Spray-on insulation (possible asbestos) used in Area B. Areas C (approximately 24 ft high) to E constructed with steel beams and metal siding. No HVAC systems in use as of June 2011. Not air tight. Damp and moldy, with visible evidence of water staining in office area A. Floor slab in poor condition, with cracks and unsealed joints throughout the building, particularly cracked in Areas D and E. Heavy floor staining in areas B through E. Exterior openings - office windows, personnel doors, sliding and roll-up doors. Infrequent and variable occupancy by 2 adults.

figure 30

PARCEL 5174 - COMMAND ROOFING BUILDING 1
2045 DRYDEN ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA028 AUG 09/2011

LEGEND

- APPROXIMATE SITE BOUNDARY
- EDGE OF WATER
- PARCEL BOUNDARY
- VAPOR INTRUSION STUDY BUILDING LOCATION
- MW-202 — MONITORING WELL LOCATION
- BH01-09 — SOIL BORING LOCATION
- VAS01 — VAS SAMPLING LOCATION
- GP21-09, GP04-09 — SOIL VAPOR PROBE LOCATION
- TP1 — TEST PIT LOCATION
- TT1 — TEST TRENCH LOCATION
- PROPOSED SUB SLAB SOIL VAPOR SAMPLE LOCATION
- PROPOSED INDOOR AIR SAMPLE LOCATION
- PROPOSED CRAWL SPACE AIR SAMPLE LOCATION
- CONTINGENCY INDOOR AIR SAMPLE LOCATION

0 20 50ft

GP09-09	9/15/2009 6.5-7.5 ft. BGS ug/m3
Tetrachloroethene	2000

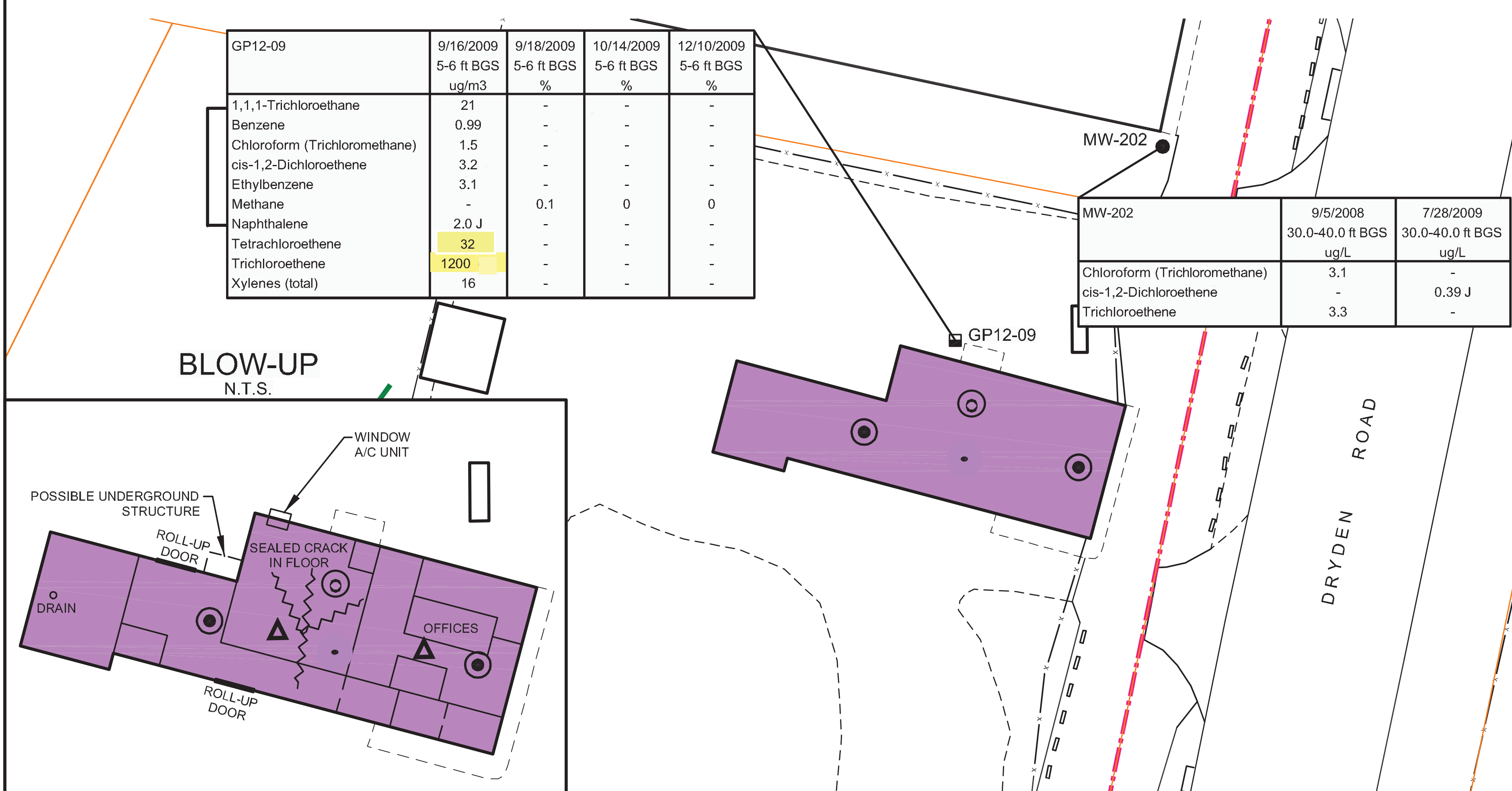
SAMPLE ID — SAMPLE DATE — SAMPLE DEPTH — SAMPLE UNITS — CONCENTRATION VALUE — COMPOUND — EXCEEDANCES

SOIL VAPOR SCREENING LEVELS (ug/m3)

CHEMICAL NAME	COMMERCIAL/ INDUSTRIAL SVSLs
1,1,1-Trichloroethane	220000
1,1-Dichloroethane	77
1,1-Dichloroethene	8800
Benzene	16
Chlorobenzene	2200
Chloroform (Trichloromethane)	5.3
cis-1,2-Dichloroethene	2600
Ethylbenzene	49
Naphthalene	3.6
Tetrachloroethene	21
trans-1,2-Dichloroethene	2600
Trichloroethene	61
Vinyl Chloride	28
Xylenes (total)	4400
METHANE - UEL = 15% / LEL = 5% / 10% of LEL = 0.5%	

NOTE: THERE IS ANOTHER SOIL VAPOR SAMPLE LOCATED NEARBY (GP13-09). SEE FIGURE 3.

NOTES:
Methane concentrations shown in units of %.
LEL - Lower Explosive Limit; UEL - Upper Explosive Limit
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
The IRIS toxicity value for TCE was updated in September 2011. The SGSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.



GP12-09	9/16/2009 5-6 ft BGS ug/m3	9/18/2009 5-6 ft BGS %	10/14/2009 5-6 ft BGS %	12/10/2009 5-6 ft BGS %
1,1,1-Trichloroethane	21	-	-	-
Benzene	0.99	-	-	-
Chloroform (Trichloromethane)	1.5	-	-	-
cis-1,2-Dichloroethene	3.2	-	-	-
Ethylbenzene	3.1	-	-	-
Methane	-	0.1	0	0
Naphthalene	2.0 J	-	-	-
Tetrachloroethene	32	-	-	-
Trichloroethene	1200	-	-	-
Xylenes (total)	16	-	-	-

MW-202	9/5/2008 30.0-40.0 ft BGS ug/L	7/28/2009 30.0-40.0 ft BGS ug/L
Chloroform (Trichloromethane)	3.1	-
cis-1,2-Dichloroethene	-	0.39 J
Trichloroethene	3.3	-

PROFILE VIEW
N.T.S.

Building Characteristics:
Single-story, commercial-use building, constructed prior to 1949. 4,557 sq. ft. slab-on-grade, unsealed concrete building, with crawl space possibly present on south side. Shallow concrete pit present in southwest corner of warehouse. Large sealed floor cracks observed in middle portion of building. Floor staining observed in warehouse and rear storage shed. Gasoline UST removed from former Conway Fence facility in 1990. Weather seals in poor condition. Overhead doors open at time of building survey. Heated by forced air natural gas furnace. Central A/C present in retail and office areas. Window unit A/C present in northern portion of building. Exterior openings - vents, fans, utility pipe penetrations, windows, overhead and personnel doors.
Occupancy - tenant about to vacate premises at time of building survey

figure 31

PARCEL 5175 - FORMER ALLIANCE EQUIPMENT & SUPPLY BUILDING 1
2075 DRYDEN ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279.44.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINE.
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA029 AUG 09/2011

TABLE 1

SUMMARY OF BUILDING SURVEY INSPECTION RESULTS AND PROPOSED SAMPLING STRATEGY
VAPOR INTRUSION INVESTIGATION
SOUTH DAYTON DUMP AND LANDFILL SITE,
MORAINE, OHIO

Parcel	*Building Number*	*Building Footprint Area (ft^2)*	*Address*	*Commercial, Residential, or Industrial*	*Uses*	*Hours of Occupancy (Number of Occupants)*	*Vadose Zone Soil Type (Investigative Locations)*	*Sampling Strategy*	*Location and Number of Samples*	*Sampling Strategy Rationale*	*Additional Factors for Consideration*
3207	1	9,954	2153 Dryden Rd.	Commercial / Industrial	Globe Equipment – primarily office space with some assembly and warehouse space	Weekdays, 8AM-5PM (15 adult workers)	Sand and Gravel Fill (MW-210A/B, GP11-09)	<u>**Sub-slab Soil Vapor (5 probes)**</u> - VOCs (including naphthalene) by TO-15 (8 hour) - Methane monitoring before and after 8-hour sample with field meter <u>**Indoor Air**</u> - Methane monitoring before and after sub-slab soil vapor sample with field meter	1 - cubicle area 1 - kitchen area 1 - warehouse area 2 - along eastern offices hallway	- Multiple probes because building footprint is larger than 1,500 ft^2 and is compartmentalized - VOC sampling because building is designed for occupancy - 8-hour sampling because building is industrial/commercial - Methane monitoring at all VI Study buildings	Previous property uses includes junk yard and gas station. Historic gasoline releases occurred on property.
3207	2	19,803	2215 East River Rd.	Industrial	Globe Equipment – primarily warehouse/ assembly space with some office space	Weekdays, 7AM-5PM (25 adult workers)	Sand and Gravel Fill (MW-210A/B, GP09-09, GP11-09)	<u>**Sub-slab Soil Vapor (6 probes)**</u> - VOCs by TO-15 (8 hour) - Methane monitoring before and after 8-hour sample with field meter <u>**Indoor Air**</u> - Methane monitoring before and after sub-slab soil vapor sample with field meter	1 - offices hallway 1 - service office 1 - parts department 1 - production department 1 - receiving area 1- finished goods warehouse (5-yr. old building addition)	- Multiple probes because building footprint is larger than 1,500 ft2 and is compartmentalized - VOC sampling because building is designed for occupancy - 8-hour sampling because building is industrial - Methane monitoring at all VI Study buildings	Floor cracks observed throughout portions of building, floor staining in a number of areas. Historically used as a machine shop - chlorinated solvent use possible. One aluminum addition (Finished Goods Warehouse) is present.
3253	1	926	[redacted]	Residential	Single family residence	7 days per week, 24-hours per day (1 adult)	Sand and Gravel Fill (GP09-09)	<u>**Sub-slab Soil Vapor (2 probes)**</u> - VOCs by TO-15 (24 hour) - Methane monitoring before and after 24-hour sample with field meter <u>**Indoor Air (1 location)**</u> - VOCs by TO-15 (24 hour) - Methane monitoring before and after 24-hour sample with field meter	1- center of floor area 1 - northwest side of basement floor area 1 - indoor air sample in center of basement	- Multiple probes because building is residential - VOC sampling because building is designed for occupancy - 24-hour sampling because building is residential - Methane monitoring at all VI Study buildings	Basement unused, no visible sources of potential sample cross-contamination. Hole in floor contains pipe for condensate and is in line with sewer penetration. Sampling near hole is not recommended due to presence of utilities and because concentrations may be lower at this location due to dilution by basement air.
3253	2	1,128	[redacted]	Residential	Garage	No occupancy; storage only	Sand and Gravel Fill (GP09-09)	<u>**Sub-slab Soil Vapor (1 probe)**</u> - Methane monitoring with field meter (twice, at least 8 hours apart) <u>**Indoor Air**</u> - Methane monitoring with field meter (twice, at least 8 hours apart)	1 - northeast poured concrete section	- Single probe because building footprint is less than 1,500 ft^2 and not compartmentalized - No VOC sampling because building is not designed for occupancy - Methane monitoring at all VI Study buildings	Building used for parking only. Six separate poured sections observed, with unsealed joints. Gasoline present in garage.
3254	1	2,000	2233 Rear East River Rd.	Commercial	Middletown Trucking - heavy truck repair with small unsealed office	Weekdays, 8AM-5PM (3 to 4 adult workers)	Sand and Gravel Fill (GP09-09)	<u>**Sub-slab Soil Vapor (2 probes)**</u> - VOCs by TO-15 (8 hour) - Methane monitoring before and after 8-hour sample with field meter <u>**Indoor Air**</u> - Methane monitoring before and after sub-slab soil vapor sample with field meter	1 - center of building 1 - office area	- Multiple probes because building footprint is larger than 1,500 ft^2 - VOC sampling because building is designed for occupancy - 8-hour sampling because building is commercial - Methane monitoring at all VI Study buildings	Chemical storage and heavy floor staining observed in shop interior. Floor cracks observed. Parts washer present, solvent now mineral spirits but may have been chlorinated solvents historically.
4610	A	685	2225A East	Commercial	ARA Trucking -	Variable, several hours every few	Sand and Gravel Fill	<u>**Crawl Space Air (1 location)**</u> - VOCs by TO-15 (8 hour)	1 - center of crawl space beneath trailer	- Crawl space air sample because there is approximately 2 feet separating the trailer floor	Situated on former Mantle Oil

TABLE 1

SUMMARY OF BUILDING SURVEY INSPECTION RESULTS AND PROPOSED SAMPLING STRATEGY
VAPOR INTRUSION INVESTIGATION
SOUTH DAYTON DUMP AND LANDFILL SITE,
MORAINE, OHIO

Parcel	*Building Number*	*Building Footprint Area (ft^2)*	*Address*	*Commercial, Residential, or Industrial*	*Uses*	*Hours of Occupancy (Number of Occupants)*	*Vadose Zone Soil Type (Investigative Locations)*	*Sampling Strategy*	*Location and Number of Samples*	*Sampling Strategy Rationale*	*Additional Factors for Consideration*
			River Rd.		trailer used as office	weeks (2 adult workers)	(GP09-09)	- Methane monitoring before and after 8-hour sample with field meter **<u>Indoor Air</u>** - Methane monitoring before and after crawl space air sample with field meter	and above slab	and the underlying concrete slab - Single crawl space air sampling location because building footprint is less than 1,500 ft^2 and the crawl space is not compartmentalized - VOC sampling because building is designed for occupancy - 8-hour sampling because building is commercial - Methane monitoring at all VI Study buildings	property.
4610	B	1,800	2225B East River Rd.	Commercial	Ron Barnett Construction - Storage (estate items for auction) with unused modular office	Occasionally 2-3 times per month to drop off or pick up items (1 or 2 adult workers)	Sand, Silt, and Gravel Fill (TT-13, VAS-17, GP10-09)	**<u>Sub-slab Soil Vapor (1 probe)</u>** - VOCs by TO-15 (8 hour) - Methane monitoring before and after 8-hour sample with field meter **<u>Indoor Air</u>** - Methane monitoring before and after sub-slab soil vapor sample with field meter	1 - Center of building	- Single probe because building footprint is less than 1,500 ft^2 and the vacant modular office is the only compartment in the building - VOC sampling because building is designed for occupancy - 8-hour sampling because building is commercial - Methane monitoring at all VI Study buildings	Cracks observed in floor and foundation walls. Situated on former Mantle Oil property.
4610	C	1,088	2225C East River Rd.	Commercial	Ron Barnett Construction - Storage	No occupancy; storage only	Sand and Silt Fill (GP10-09)	**<u>Sub-slab Soil Vapor (1 probe)</u>** - Methane monitoring before with field meter (twice, at least 8 hours apart) **<u>Indoor Air</u>** - Methane monitoring with field meter (twice, at least 8 hours apart)	1 - Center of building	- Single probe because building footprint is less than 1,500 ft^2 and not compartmentalized - No VOC sampling because building is not designed for occupancy - Methane monitoring at all VI Study buildings	Chemicals on bench and drums observed in building interior. Situated on former Mantle Oil property.
4610	D	1,200	2225D East River Rd.	Commercial	Ron Barnett Construction - Storage	No occupancy; storage only	Sand and Silt Fill (GP10-09)	**<u>Sub-slab Soil Vapor (1 probe)</u>** - Methane monitoring before with field meter (twice, at least 8 hours apart) **<u>Indoor Air</u>** - Methane monitoring with field meter (twice, at least 8 hours apart)	1 - Center of building	- Single probe because building footprint is less than 1,500 ft^2. and not compartmentalized - No VOC sampling because building is not designed for occupancy - Methane monitoring at all VI Study buildings	Chemicals visible in southern portion of storage building. Floor cracking observed, especially at north end. Situated on former Mantle Oil property.
4610	E	1,200	2225E East River Rd.	Commercial	Ron Barnett Construction - office, car repair shop and storage	Car repair section – variable occupancy including evenings & weekends (2 adult workers) Office - variable occupancy during business hours (1 adult worker)	Sand, Silt, and Gravel Fill (TT-17. MW-212, GP10-09, GP09-09)	**<u>Sub-slab Soil Vapor (2 probes)</u>** - VOCs by TO-15 (8 hour) - Methane monitoring before and after 8-hour sample with field meter **<u>Indoor Air</u>** - Methane monitoring before and after sub-slab soil vapor sample with field meter	1 - center of office (NW) 1 - center of shop area	- Multiple probes because building is compartmentalized - VOC sampling because building is designed for occupancy - 8-hour sampling because building is commercial - Methane monitoring at all VI Study buildings	Majority of building is used for storage and car repair with no weather seals and outdoor to indoor air exchange during warmer weather. Office has weather seals in fair condition. Vehicle painting in the car repair area. Significant floor cracks in office and adjacent storage areas. Some staining observed in shop area. Situated on former Mantle Oil property
5054	MP	365	1927 Dryden Rd.	Commercial	Vacant - former Murphy's Plumbing (Sales of used plumbing	No occupancy - tenant vacated site on July 1, 2011	Sand and Gravel Fill (MW219)	**<u>Crawl Space Air (1 location)</u>** - VOCs by TO-15 (8 hour) - Methane monitoring before and	1 - center of crawl space beneath floor and above slab	- Crawl space air sample because building is on raised foundation, with a crawl space - Single crawl space air sampling location	Building is in poor condition and unsuited for most purposes. Current owner

TABLE 1

SUMMARY OF BUILDING SURVEY INSPECTION RESULTS AND PROPOSED SAMPLING STRATEGY
VAPOR INTRUSION INVESTIGATION
SOUTH DAYTON DUMP AND LANDFILL SITE,
MORAINE, OHIO

Parcel	*Building Number*	*Building Footprint Area (ft²)*	*Address*	*Commercial, Residential, or Industrial*	*Uses*	*Hours of Occupancy (Number of Occupants)*	*Vadose Zone Soil Type (Investigative Locations)*	*Sampling Strategy*	*Location and Number of Samples*	*Sampling Strategy Rationale*	*Additional Factors for Consideration*
					fixtures)			after 8-hour sample with field meter **Indoor Air** - Methane monitoring before and after crawl space air sample with field meter		because building footprint is less than 1,500 ft² and the crawl space is not compartmentalized - VOC sampling because building is designed for occupancy - 8-hour sampling because building is commercial - Methane monitoring at all VI Study buildings	vacated site July 1, 2011.
5054	1	1,500	1901 Dryden Rd.	Commercial	Vacant – former Valley Asphalt plant offices	No occupancy - vacant for past 4 - 5 years	Sand and Gravel Fill (GP17-09)	**Sub-slab Soil Vapor (1 probe)** - VOCs by TO-15 (8 hour) - Methane monitoring before and after 8-hour sample with field meter **Indoor Air** - Methane monitoring before and after sub-slab soil vapor sample with field meter	1 - center of building	- Single probe because building footprint is less than 1,500 ft² and not compartmentalized - VOC sampling because building is designed for occupancy - 8-hour sampling because building is commercial - Methane monitoring at all VI Study buildings	
5054	2	4,888	1903 Dryden Rd.	Commercial / Industrial	Valley Asphalt – storage and former office space (north side of building)	No occupancy – storage only and north side office space has been vacant for 10 years	Sand Fill (GP18-09); Silty Sand and Gravel Fill (BH08-09)	**Sub-slab Soil Vapor (2 probes)** - VOCs by TO-15 (8 hour) - Methane monitoring before and after 8-hour sample with field meter **Indoor Air** - Methane monitoring before and after sub-slab soil vapor sample with field meter	1 – center of office 1 – center of storage area	- Multiple probes because building footprint is larger than 1,500 ft² and is compartmentalized - VOC sampling because building is designed for occupancy - 8-hour sampling because building is commercial / industrial Methane monitoring at all VI Study buildings	Building windows are broken in storage area. Floor cracks and unsealed joints visible in open shop area. Carpet in office area has strong moldy/musty odor, and is in bad condition.
5054	3	457	1901 Dryden Rd.	Industrial	Vacant – former Valley Asphalt garage	No occupancy	Sand and Gravel Fill (GP17-09, TT-21)	**Indoor Air** - Methane monitoring with field meter (twice, at least 8 hours apart)	1 –center of building	- Indoor air sample because building has earthen floor. - Single indoor air sampling location because building footprint is less than 1,500 ft² and not compartmentalized - No VOC sampling because building is not designed for occupancy - Methane monitoring at all VI Study buildings	Building is in poor condition and unsafe to occupy. Overhead door is missing panels. Man door is missing.
5054	4	280	1901 Dryden Rd.	Industrial	Valley Asphalt – plant control building	Weekday business hours (2 adult workers)	Sand and Gravel Fill (MW-217, VAS-02)	**Sub-slab Soil Vapor (1 probe)** - VOCs by TO-15 (8 hour) - Methane monitoring before and after 8-hour sample with field meter **Indoor Air** - Methane monitoring before and after sub-slab soil vapor sample with field meter	1 – center of basement	- Single probe because building footprint is less than 1,500 ft² and the basement is not compartmentalized - VOC sampling because building is designed for occupancy - 8-hour sampling because building is industrial - Methane monitoring at all VI Study buildings	Paint storage in building.
5054	5	594	1901 Dryden Rd.	Industrial	Valley Asphalt – testing lab and office	Testing lab - Variable and rare occupancy (4 adult workers) Office - variable occupancy during	Sand and Gravel Fill (MW-217, VAS-02)	**Sub-slab Soil Vapor (1 probe)** - VOCs by TO-15 (8 hour) - Methane monitoring before and after 8-hour sample with field meter **Indoor Air** - Methane monitoring before and	1 – office area towards center of building	- Single probe because building footprint is less than 1,500 ft² and only one of the two compartments is typically used - VOC sampling because building is designed for occupancy - 8-hour sampling because building is industrial	May have historically used chlorinated solvents for asphalt testing.

TABLE 1

SUMMARY OF BUILDING SURVEY INSPECTION RESULTS AND PROPOSED SAMPLING STRATEGY
VAPOR INTRUSION INVESTIGATION
SOUTH DAYTON DUMP AND LANDFILL SITE,
MORAINE, OHIO

Parcel	*Building Number*	*Building Footprint Area (ft^2)*	*Address*	*Commercial, Residential, or Industrial*	*Uses*	*Hours of Occupancy (Number of Occupants)*	*Vadose Zone Soil Type (Investigative Locations)*	*Sampling Strategy*	*Location and Number of Samples*	*Sampling Strategy Rationale*	*Additional Factors for Consideration*
						business hours (1 adult worker)		after sub-slab soil vapor sample with field meter		- Methane monitoring at all VI Study buildings	
5054	6	218	1901 Dryden Rd.	Industrial	Valley Asphalt – storage	No occupancy; storage only	Sand Fill (TP-6)	**<u>Indoor Air</u>** - Methane monitoring with field meter (twice, at least 8 hours apart)	1 – indoor air sample from center of floor	- Indoor air sample because building has earthen floor. - Single indoor air sampling location because building footprint is less than 1,500 ft^2 and not compartmentalized - No VOC sampling because building is not designed for occupancy - Methane monitoring at all VI Study buildings	Chemical storage within building. Oil and bitumen ASTs located outside building.
5054	7	822	unknown	Industrial	Unknown – garage / storage	No occupancy; storage only	Sand and Gravel Fill (VAS-09, MW-219)	**<u>Sub-slab Soil Vapor (1 probe)</u>** - Methane monitoring before with field meter (twice, at least 8 hours apart) **<u>Indoor Air</u>** - Methane monitoring with field meter (twice, at least 8 hours apart)	1 - left side of building, minimum 5 feet from exterior wall (if access if provided, explosive gas monitoring only)	- Single probe sampling location because building footprint is less than 1,500 ft^2 and not compartmentalized - No VOC sampling because building is not designed for occupancy - Methane monitoring at all VI Study buildings	Long-term vehicle storage, fluid leaks possible.
5171	1	13,700	1951 Dryden Rd.	Commercial	B&G Trucking - heavy truck repair with some office space	Weekdays, 7AM-5PM (7 adult workers)	Asphalt, Sand and Travel Fill (MW-216)	**<u>Sub-slab Soil Vapor (5 probes)</u>** - VOCs by TO-15 (8 hour) - Methane monitoring before and after 8-hour sample with field meter **<u>Indoor Air</u>** - Methane monitoring before and after sub-slab soil vapor sample with field meter	2 – office space (east side) 3 – shop area	- Multiple probes because building footprint is larger than 1,500 ft^2 and is compartmentalized - VOC sampling because building is designed for occupancy - 8-hour sampling because building is commercial - Methane monitoring at all VI Study buildings	Spills on floor of truck bay area, and pooled liquid under two trucks. Strong paint odor in NE office area and paint booth in western portion of building. Building contains a parts washer, which uses petroleum distillates.
5171	2	5,000	1951 Dryden Rd.	Commercial	B&G Trucking - heavy truck repair	Weekdays, 7AM-5PM (2 adult workers)	Sand and Silt Fill (GP16-09, MW-227, VAS-07)	**<u>Sub-slab Soil Vapor (2 probes)</u>** - VOCs by TO-15 (8 hour) - Methane monitoring before and after 8-hour sample with field meter **<u>Indoor Air</u>** - Methane monitoring before and after sub-slab soil vapor sample with field meter	1 – offices 1 – shop area	- Multiple probes because building footprint is larger than 1,500 ft^2 - VOC sampling because building is designed for occupancy - 8-hour sampling because building is commercial - Methane monitoring at all VI Study buildings	Portion of building used for paint and chemical storage. Floor contains some cracking and unsealed floor joints. Floor staining observed in bays.
5171	3	1,250	1951 Dryden Rd.	Commercial	B&G Trucking – sandblasting trucks	Occupied as needed during hours of operation 7AM-5PM	Sand and Gravel Fill (VAS-06, VAS-07)	No sampling proposed		No sampling required because the building is a steel frame with canvas walls and is open at both ends. Canvas flaps can be closed but do not provide a seal.	Operations in the building include sandblasting Building floor is asphalt.
5171	4	495	1915 Dryden Rd.	Unknown-not accessible at time of building surveys. However, it appears to have been vacant for multiple years.			Sand and Gravel Fill (VAS-09, MW-219)	**<u>Sub-slab Soil Vapor (1 probe)</u>** - VOCs by TO-15 (8 or 24 hour depending on use type) - Methane monitoring before and after 8- or 24-hour sample with field meter **<u>Indoor Air</u>**	1 - center of building	- Single probe sampling location because building footprint is less than 1,500 ft^2 - VOC sampling because building is designed for occupancy - 8 or 24-hour sampling because building is either commercial/industrial or residential - Methane monitoring at all VI Study buildings	Building is in poor condition and is likely unsafe to occupy.

TABLE 1

SUMMARY OF BUILDING SURVEY INSPECTION RESULTS AND PROPOSED SAMPLING STRATEGY
VAPOR INTRUSION INVESTIGATION
SOUTH DAYTON DUMP AND LANDFILL SITE,
MORAINE, OHIO

Parcel	*Building Number*	*Building Footprint Area (ft^2)*	*Address*	*Commercial, Residential, or Industrial*	*Uses*	*Hours of Occupancy (Number of Occupants)*	*Vadose Zone Soil Type (Investigative Locations)*	*Sampling Strategy*	*Location and Number of Samples*	*Sampling Strategy Rationale*	*Additional Factors for Consideration*
								- Methane monitoring before and after sub-slab soil vapor sample with field meter			
5172	1	11,600 ft^2 total; 5,800 ft^2 accessible at time of building survey	2015 + 2019 Dryden Rd.	Commercial / Industrial	Northern half of the building is S&J Precision Machining, and southern half is Overstreet Painting	Northern half - Weekdays, 6AM-5PM (5 adult workers) Southern half – unknown but likely infrequent	Silty Sand Fill (MW-208, VAS-08)	**Sub-slab Soil Vapor (7 probes)** - VOCs by TO-15 (8 hour) - Methane monitoring before and after 8-hour sample with field meter **Indoor Air** - Methane monitoring before and after sub-slab soil vapor sample with field meter	2 - northern half workspace 1 - northern half warehouse 1 - center of building 3 - southern half	- Multiple probes because building footprint is larger than 1,500 ft^2 and is compartmentalized - VOC sampling because building is designed for occupancy - 8-hour sampling because building is commercial / industrial - Methane monitoring at all VI Study buildings - No probes in north office wing because of suspected asbestos-containing material tiles	Floor staining observed in warehouse at rear of building. Chemical storage cabinet contains IPA and PCE containers. Southern half of building was not accessible during the building surveys (Overstreet Painting).
5172	2	2,886	2003 Dryden Rd.	Commercial	Vacant – former A-Evans Air Filter Service (supply and cleaning of grease filters)	No occupancy – recently vacated	Sand and Silt Fill (GP15-09)	**Sub-slab Soil Vapor (2 probes)** - VOCs by TO-15 (8 hour) - Methane monitoring before and after 8-hour sample with field meter **Indoor Air** - Methane monitoring before and after sub-slab soil vapor sample with field meter	1 – office space (south side) 1 – center of warehouse	- Multiple probes because building footprint is larger than 1,500 ft^2 and is compartmentalized - VOC sampling because building is designed for occupancy - 8-hour sampling because building is commercial - Methane monitoring at all VI Study buildings	Former building activities include metal workshop, possibly with a degreaser given large vent opening in wall. Dark staining observed around grease filter wash area. Metal shed on north side of building.
5172	3	721	Unknown	Unknown-not accessible at time of building surveys				**Sub-slab Soil Vapor (1 probe)** - VOCs by TO-15 (8 hour) if building is designed for occupancy - Methane monitoring before and after 8-hour sample with field meter **Indoor Air** - Methane monitoring before and after sub-slab soil vapor sample with field meter	1 - center of building	- Single probe because building footprint is less than 1,500 ft^2 - VOC sampling if building is designed for occupancy - 8-hour sampling because building is commercial or industrial - Methane monitoring at all VI Study buildings	
5173	1	8,250	2031 Dryden Rd.	Commercial	SIM Trainer - combat training and gun range	Occupied during business hours (M-W-F 5 PM to 9 PM, Tu-Th 10AM – 2 PM, Sat 9 AM – 5 PM, Sun 1 PM – 5 PM) (one adult worker for 4 hour shifts and customers)	Sand and Gravel Fill (GP14-09)	**Sub-slab Soil Vapor (3 probes)** - VOCs by TO-15 (8 hour) - Methane monitoring before and after 8-hour sample with field meter **Indoor Air** - Methane monitoring before and after sub-slab soil vapor sample with field meter	1 - classroom / sales area 1 - gun range shooting area 1 – storage area on northern side	- Multiple probes because building footprint is larger than 1,500 ft^2 and is compartmentalized - VOC sampling because building is designed for occupancy - 8-hour sampling because building is commercial - Methane monitoring at all VI Study buildings	Heavy staining observed in northern portion of building. Former machine shop. Western section of the building is inaccessible. Northern section is accessed infrequently.
5174	1	12,500	2045 Dryden Rd.	Commercial	Command Roofing - storage with former office space on east side	No occupancy – storage only and east side office space has been vacant for multiple years Building is accessed	Sand and Gravel Fill and Foundry Sand (TT-10); Silt and Clay Fill (VAS-15); Sand Fill	**Sub-slab Soil Vapor (5 probes)** - VOCs by TO-15 (8 hour) - Methane monitoring before and after 8-hour sample with field meter **Indoor Air** - Methane monitoring before and after sub-slab soil vapor sample with	1 – former office space on east side 4 - storage area	- Multiple probes because building footprint is larger than 1,500 sq. ft. and is compartmentalized - VOC sampling because building is designed for occupancy - 8-hour sampling because building is commercial	Building is not partitioned through Sections B to E, though grade beams and foundation walls may be present. Former building activities included boiler manufacturing involving use of solvents. Cracks observed throughout. Water

TABLE 1

SUMMARY OF BUILDING SURVEY INSPECTION RESULTS AND PROPOSED SAMPLING STRATEGY
VAPOR INTRUSION INVESTIGATION
SOUTH DAYTON DUMP AND LANDFILL SITE,
MORAINE, OHIO

Parcel	*Building Number*	*Building Footprint Area (ft^2)*	*Address*	*Commercial, Residential, or Industrial*	*Uses*	*Hours of Occupancy (Number of Occupants)*	*Vadose Zone Soil Type (Investigative Locations)*	*Sampling Strategy*	*Location and Number of Samples*	*Sampling Strategy Rationale*	*Additional Factors for Consideration*
						infrequently only to pick-up materials (2 adult workers)	(GP13-09)	field meter		- Methane monitoring at all VI Study buildings	staining observed in Section A. Heavily stained flooring throughout Sections B to E. In Sections D and E, slab observed in very bad condition. Paint odor noticeable. Mold odor in offices. Was a boiler manufacturer for approximately 40 years.
5175	1	4,557	2075 Dryden Rd.	Commercial	Vacant - former Alliance Equipment and Supply (office space on east side, retail space in center and warehouse space on west side)	Tenant vacating premises at time of building survey.	Sand Fill (GP12-09)	**<u>Sub-slab Soil Vapor (3 probes)</u>** - VOCs by TO-15 (8 hour) - Methane monitoring before and after 8-hour sample with field meter **<u>Indoor Air</u>** - Methane monitoring before and after sub-slab soil vapor sample with field meter	1 – former office space 1 – former retail space 1 – former warehouse	- Multiple probes because building footprint is larger than 1,500 sq. ft. and is compartmentalized - VOC sampling because building is designed for occupancy - 8-hour sampling because building is commercial - Methane monitoring at all VI Study buildings	Floor staining observed in warehouse area and rear storage shed. Paints and chemicals observed in warehouse area. Gasoline UST was removed in 1990 from former Conway Fence facility located on Parcel 5175.

Table 2
September 2009 and January 2010 Soil Vapor VOC
Analytical Data Compared to Industrial Soil Vapor Screening Levels
South Dayton Dump and Landfill Site, Moraine, OH

Sample Location:		GP01-09	GP02-09		GP03-09	GP04-09	GP05-09	GP06-09	GP07-09	GP08-09	GP09-09
Sample ID:		A-38443-092909-NZ-022	A-038443-091509-NH-011	A-038443-091509-NH-012	A-038443-091509-GL-013	A-038443-091609-NH-015	A-038443-091509-GL-014	A-038443-091609-NH-019	A-038443-091609-GL-020	A-038443-091709-NH-021	A-038443-091509-NH-009
Sample Date:		9/29/2009	9/15/2009		9/15/2009	9/16/2009	9/15/2009	9/16/2009	9/16/2009	9/17/2009	9/15/2009
Sample type:		Normal	Normal	Duplicate	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Sampling Company:		CRA	CRA		CRA	CRA	CRA	CRA	CRA	CRA	CRA
Units:		ug/m3	ug/m3		ug/m3	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3
Parameter											
Volatile Organic Compounds	*Industrial SVSL*										
1,1,1-Trichloroethane	220000	110 U	11 U	11 UJ	73	1.9	10	1.6 U	55 U	0.93 J	18
1,1,2,2-Tetrachloroethane	2.1	140 U	14 U	14 UJ	2.1 U	2.1 U	2.1 U	2.1 U	70 U	2.1 U	2.1 U
1,1,2-Trichloroethane	7.7	110 U	11 U	11 UJ	1.6 U	1.6 U	1.6 U	1.6 U	55 U	1.6 U	1.6 U
1,1-Dichloroethane	77	80 U	8.1 U	8.1 UJ	10	56	1.2 U	1.2 U	41 U	1.2 U	1.2 U
1,1-Dichloroethene	8800	78 U	7.9 U	7.9 UJ	0.79 U	1.5	0.79 U	0.79 U	40 U	0.79 U	0.79 U
1,2,4-Trichlorobenzene	88	370 U	37 U	37 UJ	5.9 U	5.9 U	5.9 U	5.9 U	190 U	5.9 U	5.9 U
1,2-Dibromo-3-chloropropane (DBCP)	0.02	190 U	97 UJ	97 UJ	9.7 UJ	9.7 UJ	9.7 UJ	9.7 UJ	490 UJ	9.7 UJ	9.7 UJ
1,2-Dibromoethane (Ethylene dibromide)	0.2	150 U	15 U	15 UJ	3.1 U	3.1 U	3.1 U	3.1 U	78 U	3.1 U	3.1 U
1,2-Dichlorobenzene	8800	120 U	12 U	12 UJ	2.4 U	2.4 U	2.4 U	2.4 U	61 U	2.4 U	2.4 U
1,2-Dichloroethane	4.7	120 U	12 U	12 UJ	0.81 U	0.81 U	0.81 U	0.81 U	62 U	0.81 U	0.81 U
1,2-Dichloropropane	12	140 U	14 U	14 UJ	0.92 U	0.92 U	0.92 U	0.92 U	70 U	0.92 U	0.92 U
1,3-Dichlorobenzene[a]	11	240 U	24 U	24 UJ	2.4 U	10	6.4	2.4 U	120 U	2.0 J	2.4 U
1,4-Dichlorobenzene	11	240 U	24 U	24 UJ	1.9 J	1.3 J	2.4 U	2.4 U	120 U	2.4 U	2.4 U
2-Butanone (Methyl ethyl ketone) (MEK)	220000	290 U	29 U	29 UJ	3.7	4.6	3.0	2.9 U	150 U	1.9 J	1.5 J
2-Hexanone	1300	400 U	41 U	41 UJ	2.0 U	2.0 U	2.0 U	2.0 U	210 U	2.0 U	2.0 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	130000	400 U	41 U	41 UJ	1.6 U	1.6 U	1.6 U	1.6 U	210 U	1.6 U	1.6 U
Acetone	1400000	230 U	27 U	41 UJ	24 U	84 U	20 U	7.1 U	120 U	17 UJ	11 U
Benzene	16	**860**	**37**	**36 J**	1.3	**110**	0.83 J	0.96 U	49 U	1.8	1.9
Bromodichloromethane	3.3	130 U	13 U	13 UJ	2.0 U	2.0 U	2.0 U	2.0 U	68 U	2.0 U	2.0 U
Bromoform	110	200 U	21 U	21 UJ	4.1 U	4.1 U	4.1 U	4.1 U	100 U	4.1 U	4.1 U
Bromomethane (Methyl bromide)	220	150 U	8.5 J	16 UJ	1.6 U	1.6 U	1.6 U	1.6 U	79 U	1.6 U	1.6 U
Carbon disulfide	31000	310 U	18 J	18 J	20	16	6.7	6.5	160 U	8.4	13
Carbon tetrachloride	20	120 U	13 U	13 UJ	1.9 U	1.9 U	1.9 U	1.9 U	64 U	1.9 U	1.9 U
Chlorobenzene	2200	**12000**	9.2 U	9.2 UJ	1.4 U	1.4 U	2.4	1.4 U	47 U	1.4 U	1.9
Chloroethane	440000	100 U	4.8 J	4.5 J	1.1 U	12	1.1 U	1.1 U	53 U	1.1 U	1.1 U
Chloroform (Trichloromethane)	5.3	96 U	9.8 U	9.8 UJ	**13**	1.5 U	1.5 U	1.5 U	49 U	1.2 J	**14**
Chloromethane (Methyl chloride)	3900	82 U	8.3 UJ	8.3 UJ	1.5 J	1.7 U	1.6 J	1.7 U	42 UJ	1.7 U	1.5 J
cis-1,2-Dichloroethene[b]	2600	52 J	22	17 J	0.66 J	1.1	1.3	0.79 U	40 U	0.79 U	1.4
cis-1,3-Dichloropropene[c]	3100	90 U	9.1 U	9.1 UJ	1.8 U	1.8 U	1.8 U	1.8 U	46 U	1.8 U	1.8 U
Cyclohexane	260000	1300	550	550 J	1.7 U	30	1.7 U	1.7 U	35 U	2.1	1.7 U
Dibromochloromethane	4.5	170 U	17 U	17 UJ	3.4 U	3.4 U	3.4 U	3.4 U	86 U	3.4 U	3.4 U
Dichlorodifluoromethane (CFC-12)	4400	150 U	1400	1400 J	1.5 J	4.5	120	4.0	75 U	63	2.5
Ethylbenzene	49	**1100**	10	16 J	5.5	**110**	3.5	1.3 U	44 U	4.4	3.2
Isopropyl benzene	18000	260	9.8 U	9.8 UJ	2.5 U	12	2.5 U	2.5 U	50 U	2.5 U	2.5 U
Methyl tert butyl ether (MTBE)	470	71 U	7.2 U	7.2 UJ	3.6 U	3.6 U	3.6 U	3.6 U	37 U	3.6 U	3.6 U
Methylene chloride	260	59 J	6.9 U	6.9 UJ	0.99 J	1.0 U	6.5	1.0 U	19 J	0.55 J	1.0 U
Naphthalene	3.6	310 U	31 U	31 UJ	2.2 J	2.6 U	2.6 U	2.6 U	160 U	2.6 U	**3.8**
Styrene	44000	84 U	8.5 U	8.5 UJ	1.7 U	1.7 U	1.7 U	1.7 U	43 U	1.7 U	1.7 U
Tetrachloroethene	21	130 U	14 U	14 UJ	**610**	2.7 U	13	1.5 J	69 U	**25**	**120**
Toluene	220000	130	23	18 J	12	680	9.3	1.1 U	27 J	22	12
trans-1,2-Dichloroethene	2600	78 U	7.9 U	7.9 UJ	0.79 U	0.79 U	0.79 U	0.79 U	40 U	0.79 U	0.79 U
trans-1,3-Dichloropropene[d]	31	90 U	9.1 U	9.1 UJ	1.8 U	1.8 U	1.8 U	1.8 U	46 UJ	1.8 U	1.8 U
Trichloroethene[e]	61	110 U	12	11 UJ	**190**	4.4	15	1.0 J	54 U	1.6 J	**2000**
Trichlorofluoromethane (CFC-11)	13000	110 U	11 U	11 UJ	5.8	2.2 U	5.4	8.8	40 J	74	5.2
Trifluorotrichloroethane (Freon 113)	1300000	150 U	15 U	15 UJ	3.8 U	3.8 U	3.8 U	3.8 U	78 U	3.8 U	3.8 U
Vinyl chloride	28	**760**	**100**	**100 J**	0.51 U	14 J	0.51 U	0.51 U	52 U	0.51 U	0.51 U
Xylenes (total)	4400	160	62	67 J	25	480	19	1.3 U	44 U	13	19

Sample Location:	GP10-09	GP11-09	GP12-09	GP13-09	GP14-09	GP15-09	GP16-09	GP17-09	GP18-09	GP19-09	GP20-09			GP21-09
Sample ID:	A-038443-091509-GL-010	A-038443-091609-NH-017	A-038443-091609-GL-018	A-038443-090409-NZ-001	A-038443-091109-NZ-002	A-038443-091109-NH-003	A-038443-091409-GL-008	A-038443-091109-NZ-004	A-038443-091109-NH-005	A-038443-091409-GL-006	A-038443-091409-NH-007	A-38443-012910-NZ-023	A-38443-012910-NZ-024	A-038443-091609-GL-016
Sample Date:	9/15/2009	9/16/2009	9/16/2009	9/4/2009	9/11/2009	9/11/2009	9/14/2009	9/11/2009	9/11/2009	9/14/2009	9/14/2009	1/29/2010		9/16/2009
Sample type:	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Duplicate	Normal
Sampling Company:	CRA	CRA	CRA	CRA	CRA	CRA	CRA	CRA	CRA	CRA	CRA	CRA		CRA
Units:	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3		ug/m3
Parameter														
Volatile Organic Compounds														
1,1,1-Trichloroethane	14	2.3	21	33 U	7.9 U	22 U	11 U	22	550 U	9.9 U	570 U	220 U	220 U	1.6 U
1,1,2,2-Tetrachloroethane	2.1 U	2.1 U	2.1 U	41 U	9.9 U	28 U	14 U	6.2 U	700 U	12 U	720 U	280 U	280 U	2.1 U
1,1,2-Trichloroethane	1.6 U	1.6 U	1.6 U	33 U	7.9 U	22 U	11 U	4.9 U	550 U	9.9 U	570 U	220 U	220 U	1.6 U
1,1-Dichloroethane	2.1	1.2 U	1.2 U	**2900**	8.2	**7200**	66	**340**	**400 J**	7.4 U	420 U	160 U	160 U	6.2
1,1-Dichloroethene	0.79 U	0.79 U	0.79 U	16 U	3.8 U	420	7.9 U	12	400 U	39	420 U	160 U	160 U	1.1
1,2,4-Trichlorobenzene	5.9 U	5.9 U	5.9 U	120 U	29 U	75 U	37 U	18 U	1900 U	34 U	1900 U	760 U	750 U	5.9 U
1,2-Dibromo-3-chloropropane (DBCP)	9.7 UJ	9.7 UJ	9.7 UJ	190 U	46 U	190 U	97 UJ	29 U	4900 UJ	88 UJ	5100 UJ	2000 U	2000 U	9.7 UJ
1,2-Dibromoethane (Ethylene dibromide)	3.1 U	3.1 U	3.1 U	62 U	15 U	31 U	15 U	9.2 U	780 U	14 U	810 U	310 U	310 U	3.1 U
1,2-Dichlorobenzene	2.4 U	2.4 U	2.4 U	48 U	12 U	24 U	12 U	7.2 U	610 U	11 U	630 U	240 U	240 U	2.4 U
1,2-Dichloroethane	0.81 U	0.81 U	0.81 U	16 U	3.9 U	24 U	12 U	2.4 U	610 U	11 U	640 U	250 U	250 U	0.81 U
1,2-Dichloropropane	0.92 U	0.92 U	0.92 U	19 U	4.4 U	28 U	14 U	2.8 U	700 U	13 U	730 U	280 U	280 U	0.92 U
1,3-Dichlorobenzene[a]	2.4 U	8.8	2.4 U	48 U	12 U	48 U	9.7 J	7.2 U	1200 U	22 U	1300 U	490 U	490 U	4.0
1,4-Dichlorobenzene	2.4 U	2.4 U	2.4 U	48 U	12 U	48 U	24 U	7.2 U	1200 U	22 U	1300 U	490 U	490 U	2.4 U
2-Butanone (Methyl ethyl ketone) (MEK)	3.2	2.3 J	2.9 U	59 U	14 U	59 U	29 U	5.9 J	1500 U	27 U	1500 U	600 U	600 U	1.9 J
2-Hexanone	2.0 U	2.0 U	2.0 U	41 U	9.8 U	82 U	41 U	6.1 U	2100 U	37 U	2100 U	830 U	830 U	2.0 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	3.9 J	1.6 U	1.6 U	33 U	7.9 U	82 U	74	4.9 U	2100 U	37 U	2100 U	830 U	830 U	1.6 U
Acetone	21 U	18 U	7.7 U	38 U	11 U	48 U	24 U	32 U	1200 U	22 U	1200 U	480 U	480 U	1.9 U
Benzene	1.7	0.83 J	0.99	19 U	4.6 U	**250**	**18**	**44**	**14000**	**16**	500 U	200 U	190 U	**34**
Bromodichloromethane	2.0 U	2.0 U	2.0 U	40 U	9.7 U	27 U	13 U	6.0 U	680 U	12 U	700 U	270 U	270 U	2.0 U
Bromoform	4.1 U	4.1 U	4.1 U	83 U	20 U	42 U	21 U	12 U	1000 U	19 U	1100 U	420 U	420 U	4.1 U
Bromomethane (Methyl bromide)	1.6 U	1.6 U	1.6 U	31 U	7.5 U	31 U	16 U	4.6 U	790 U	8.2 J	810 U	320 U	310 U	1.6 U
Carbon disulfide	11	9.2	19	63 U	15	63 U	8.2 J	14	1600 U	10 J	1600 U	630 U	630 U	10
Carbon tetrachloride	1.9 U	1.9 U	1.9 U	38 U	9.1 U	25 U	13 U	5.6 U	640 U	11 U	660 U	260 UJ	250 UJ	1.9 U
Chlorobenzene	1.4 U	1.1 J	1.4 U	28 U	6.6 U	18 U	9.2 U	2.4 J	470 U	8.4 U	480 U	190 U	190 U	1.4 U
Chloroethane	1.1 U	1.1 U	1.1 U	410	5.1 U	290	6.4 J	3.2 U	1400	8.1 J	550 U	210 U	210 U	1.7
Chloroform (Trichloromethane)	4.5	1.5 U	1.5	29 U	**80**	20 U	**150**	4.4 U	490 U	8.9 U	510 U	200 U	200 U	1.5 U
Chloromethane (Methyl chloride)	1.2 J	0.99 J	0.85 J	33 U	7.9 U	17 U	8.3 UJ	4.9 U	420 UJ	7.5 UJ	430 UJ	170 U	170 U	1.7 U
cis-1,2-Dichloroethene[b]	0.79 U	0.79 U	3.2	16 U	8.6	**4300**	4.4 J	20	340 J	1600	**16000**	**4500**	**4600**	30
cis-1,3-Dichloropropene[c]	1.8 U	1.8 U	1.8 U	36 U	8.7 U	18 U	9.1 U	5.4 U	460 U	8.3 U	480 U	180 U	180 U	1.8 U
Cyclohexane	1.7 U	1.7 U	1.7 U	390	8.3 U	14 U	6.9 U	42	50000	330	360 U	140 U	140 U	38
Dibromochloromethane	3.4 U	3.4 U	3.4 U	68 U	16 U	34 U	17 U	10 U	860 U	15 U	890 U	350 U	350 U	3.4 U
Dichlorodifluoromethane (CFC-12)	24	3.1	4.7	43	4.8 J	23 J	35	5.9 U	750 U	13 U	780 U	300 U	300 U	1.2 J
Ethylbenzene	5.4	3.0	3.1	26 U	6.3 U	17 U	6.6 J	7.0	**48000**	9.1	460 U	180 U	180 U	7.6
Isopropyl benzene	2.5 U	2.5 U	2.5 U	49 U	12 U	20 U	9.8 U	7.4 U	4100	8.9 U	520 U	200 U	200 U	2.5 U
Methyl tert butyl ether (MTBE)	1.4 J	3.6 U	3.6 U	72 U	17 U	38	5.5 J	11 U	370 U	6.6 U	380 U	150 U	150 U	3.6 U
Methylene chloride	1.0 U	0.78 J	1.0 U	21 U	5.0 U	14 U	6.9 U	3.1 U	350 U	6.3 U	360 U	140 U	140 U	1.0 U
Naphthalene	**7.9**	2.6 U	2.0 J	53 U	13 U	63 U	31 U	**5.6 J**	**980 J**	29 U	1600 U	640 U	640 U	1.8 J
Styrene	1.7 U	1.7 U	1.7 U	34 U	8.2 U	17 U	8.5 U	5.1 U	430 U	7.7 U	450 U	170 U	170 U	1.7 U
Tetrachloroethene	**40**	2.7 U	**32**	54 U	**280**	27 U	14 U	**48**	690 U	12 U	710 U	280 U	270 U	4.8
Toluene	18	11	7.9	13 J	5.7	42	12	23	2800	13	400 U	150 U	150 U	11
trans-1,2-Dichloroethene	0.79 U	0.79 U	0.79 U	16 U	3.8 U	210	7.9 U	1.3 J	400 U	7.2 U	310 J	160 U	160 U	3.4
trans-1,3-Dichloropropene[d]	1.8 U	1.8 U	1.8 U	36 U	8.7 U	18 U	9.1 UJ	5.4 U	460 U	8.3 U	480 U	180 U	180 U	1.8 U
Trichloroethene[e]	40	3.8	**1200**	43 U	**630**	**790**	11 U	**64**	540 U	**360**	**56000**	**16000**	**16000**	5.5
Trichlorofluoromethane (CFC-11)	5.2	4.4	6.7	45 U	11 U	23 U	11 U	6.7 U	570 U	10 U	590 U	230 U	230 U	2.2 U
Trifluorotrichloroethane (Freon 113)	3.8 U	3.8 U	3.8 U	77 U	18 U	31 U	15 U	11 U	780 U	14 U	800 U	310 U	310 U	3.8 U
Vinyl chloride	0.51 U	0.51 U	0.51 U	**6800**	2.5 U	**14000**	**490**	**370**	**4800**	**3000**	540 U	210 U	210 U	4.7 J
Xylenes (total)	30	14	16	26 U	7.7	18	17	35	**47000**	29	460 U	180 U	180 U	27

Notes:

Bold and shaded values exceed SVSLs

J - The parameter was positively identified; however, the associated parameter concentration is estimated.
U - The parameter was not detected. The associated numerical value is the sample quantitation limit.
UJ - The parameter was not detected. The associated numerical values is the estimated sample quantitation limit.
SVSL = Soil Vapor Screening Level
The industrial SVSLs are based on the USEPA 2011 Regional Screening Levels (June 2011) for Industrial Air. The RSLs are derived assuming a 10-6 target estimated lifetime cancer risk level or a hazard index of 1.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidebook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
[a] = An RSL is not available for 1,3-dichlorobenzene; the RSL for 1,4-dichlorobenzene was considered an evaluation surrogate for 1,3-dichlorobenzene.
[b] = An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
[c] = An RSL is not available for cis-1,3-dichloropropene; the RSL for 1,3-dichloropropene was considered an evaluation surrogate for cis-1,3-dichloropropene.
[d] = An RSL is not available for trans-1,3-dichloropropene; the RSL for 1,3-dichloropropene was considered an evaluation surrogate for trans-1,3-dichloropropene.
[e] = The IRIS toxicity value for TCE was updated in September 2011. The SVSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.

Table 3

September 2009 Soil Vapor VOC Analytical Data Compared to
Residential Soil Vapor Screening Levels
South Dayton Dump and Landfill Site, Moraine, OH

Parameter		*Sample Location:* GP06-09	GP07-09	GP08-09	GP09-09
	Sample ID:	*A-038443-091609-NH-019*	*A-038443-091609-GL-020*	*A-038443-091709-NH-021*	*A-038443-091509-NH-009*
	Sample Date:	*9/16/2009*	*9/16/2009*	*9/17/2009*	*9/15/2009*
	Sample type:	*Normal*	*Normal*	*Normal*	*Normal*
	Sampling Company:	*CRA*	*CRA*	*CRA*	*CRA*
	Units:	ug/m3	ug/m3	ug/m3	ug/m3
Volatile Organic Compounds	***Residential SVSL***				
1,1,1-Trichloroethane	52000	1.6 U	55 U	0.93 J	18
1,1,2,2-Tetrachloroethane	0.42	2.1 U	70 U	2.1 U	2.1 U
1,1,2-Trichloroethane	1.5	1.6 U	55 U	1.6 U	1.6 U
1,1-Dichloroethane	15	1.2 U	41 U	1.2 U	1.2 U
1,1-Dichloroethene	2100	0.79 U	40 U	0.79 U	0.79 U
1,2,4-Trichlorobenzene	21	5.9 U	190 U	5.9 U	5.9 U
1,2-Dibromo-3-chloropropane (DBCP)	0.0016	9.7 UJ	490 UJ	9.7 UJ	9.7 UJ
1,2-Dibromoethane (Ethylene dibromide)	0.041	3.1 U	78 U	3.1 U	3.1 U
1,2-Dichlorobenzene	2100	2.4 U	61 U	2.4 U	2.4 U
1,2-Dichloroethane	0.94	0.81 U	62 U	0.81 U	0.81 U
1,2-Dichloropropane	2.4	0.92 U	70 U	0.92 U	0.92 U
1,3-Dichlorobenzene[a]	2.2	2.4 U	120 U	2.0 J	2.4 U
1,4-Dichlorobenzene	2.2	2.4 U	120 U	2.4 U	2.4 U
2-Butanone (Methyl ethyl ketone) (MEK)	52000	2.9 U	150 U	1.9 J	1.5 J
2-Hexanone	310	2.0 U	210 U	2.0 U	2.0 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	31000	1.6 U	210 U	1.6 U	1.6 U
Acetone	320000	7.1 U	120 U	17 UJ	11 U
Benzene	3.1	0.96 U	49 U	1.8	1.9
Bromodichloromethane	0.66	2.0 U	68 U	2.0 U	2.0 U
Bromoform	22	4.1 U	100 U	4.1 U	4.1 U
Bromomethane (Methyl bromide)	52	1.6 U	79 U	1.6 U	1.6 U
Carbon disulfide	7300	6.5	160 U	8.4	13
Carbon tetrachloride	4.1	1.9 U	64 U	1.9 U	1.9 U
Chlorobenzene	520	1.4 U	47 U	1.4 U	1.9
Chloroethane	100000	1.1 U	53 U	1.1 U	1.1 U
Chloroform (Trichloromethane)	1.1	1.5 U	49 U	**1.2 J**	**14**
Chloromethane (Methyl chloride)	940	1.7 U	42 UJ	1.7 U	1.5 J
cis-1,2-Dichloroethene[b]	630	0.79 U	40 U	0.79 U	1.4
cis-1,3-Dichloropropene[c]	6.1	1.8 U	46 U	1.8 U	1.8 U
Cyclohexane	63000	1.7 U	35 U	2.1	1.7 U
Dibromochloromethane	0.9	3.4 U	86 U	3.4 U	3.4 U
Dichlorodifluoromethane (CFC-12)	1000	4.0	75 U	63	2.5
Ethylbenzene	9.7	1.3 U	44 U	4.4	3.2
Isopropyl benzene	4200	2.5 U	50 U	2.5 U	2.5 U
Methyl tert butyl ether (MTBE)	94	3.6 U	37 U	3.6 U	3.6 U
Methylene chloride	52	1.0 U	19 J	0.55 J	1.0 U
Naphthalene	0.72	2.6 U	160 U	2.6 U	**3.8**
Styrene	10000	1.7 U	43 U	1.7 U	1.7 U
Tetrachloroethene	4.1	1.5 J	69 U	**25**	**120**
Toluene	52000	1.1 U	27 J	22	12
trans-1,2-Dichloroethene	630	0.79 U	40 U	0.79 U	0.79 U
trans-1,3-Dichloropropene[d]	6.1	1.8 U	46 UJ	1.8 U	1.8 U
Trichloroethene[e]	12	1.0 J	54 U	1.6 J	**2000**
Trichlorofluoromethane (CFC-11)	7300	8.8	40 J	74	5.2
Trifluorotrichloroethane (Freon 113)	310000	3.8 U	78 U	3.8 U	3.8 U
Vinyl chloride	1.6	0.51 U	52 U	0.51 U	0.51 U
Xylenes (total)	1000	1.3 U	44 U	13	19

Notes:

Bold and shaded values exceed SVSLs

J - The parameter was positively identified; however, the associated parameter concentration is estimated.
U - The parameter was not detected. The associated numerical value is the sample quantitation limit.
UJ - The parameter was not detected. The associate numerical values is the estimated sample quantitation limit.
SVSL = Soil Gas Screening Level
The residential SVSLs are based on the EPA 2011 Regional Screening Levels (June 2011) for Residential Air. The RSLs are derived assuming a 10^{-6} target estimated lifetime cancer risk level or a hazard index of 1.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidbook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
[a] = An RSL is not available for 1,3-dichlorobenzene; the RSL for 1,4-dichlorobenzene was considered an evaluation surrogate for 1,3-dichlorobenzene.
[b] = An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
[c] = An RSL is not available for cis-1,3-dichloropropene; the RSL for 1,3-dichloropropene was considered an evaluation surrogate for cis-1,3-dichloropropene.
[d] = An RSL is not available for trans-1,3-dichloropropene; the RSL for 1,3-dichloropropene was considered an evaluation surrogate for trans-1,3-dichloropropene.
[e] = The IRIS toxicity value for TCE was updated in September 2011. The SVSL in this table was not updated; it is based on the June 2011 RSL. However, the screening levels for the Work Plan (Tables 5 - 7) are based on the updated TCE toxicity value.

Table 4
September, October and December 2009 Soil Vapor Methane Field Measurements Compared to Upper and Lower Explosive Levels
South Dayton Dump and Landfill Site, Moraine, OH

			Sample Location:	*GP01-09*			*GP02-09*			*GP03-09*		
			Sample Date:	*9/18/2009*	*10/14/2009*	*12/10/2009*	*9/18/2009*	*10/14/2009*	*12/10/2009*	*9/18/2009*	*10/14/2009*	*12/10/2009*
			Units:	*%*	*%*	*%*	*%*	*%*	*%*	*%*	*%*	*%*
Parameter	*UEL*	*LEL*	*10% LEL*									
Methane	15	5	0.5	***28.1***	***28.4***	***23.2***	***19.6***	***19.8***	***20.5***	0	0	0

			Sample Location:	*GP04-09*			*GP05-09*			*GP06-09*		
			Sample Date:	*9/18/2009*	*10/14/2009*	*12/10/2009*	*9/18/2009*	*10/14/2009*	*12/10/2009*	*9/18/2009*	*10/14/2009*	*12/9/2009*
			Units:	*%*	*%*	*%*	*%*	*%*	*%*	*%*	*%*	*%*
Parameter	*UEL*	*LEL*	*10% LEL*									
Methane	15	5	0.5	7.9	7.8	**0.6**	0	0	0	0.1	0	0

			Sample Location:	*GP07-09*			*GP08-09*			*GP09-09*		
			Sample Date:	*9/18/2009*	*10/14/2009*	*12/9/2009*	*9/18/2009*	*10/14/2009*	*12/9/2009*	*9/18/2009*	*10/14/2009*	*12/9/2009*
			Units:	*%*	*%*	*%*	*%*	*%*	*%*	*%*	*%*	*%*
Parameter	*UEL*	*LEL*	*10% LEL*									
Methane	15	5	0.5	0	0	0	0	0	0	0.1	0	0

			Sample Location:	*GP10-09*			*GP11-09*		*GP12-09*		
			Sample Date:	*9/18/2009*	*10/14/2009*	*12/9/2009*	*9/18/2009*	*12/9/2009*	*9/18/2009*	*10/14/2009*	*12/10/2009*
			Units:	*%*	*%*	*%*	*%*	*%*	*%*	*%*	*%*
Parameter	*UEL*	*LEL*	*10% LEL*								
Methane	15	5	0.5	0.1	0	0	0	0	0.1	0	0

			Sample Location:	*GP13-09*			*GP14-09*			*GP15-09*		
			Sample Date:	*9/18/2009*	*10/14/2009*	*12/10/2009*	*9/18/2009*	*10/14/2009*	*12/10/2009*	*9/18/2009*	*10/14/2009*	*12/10/2009*
			Units:	*%*	*%*	*%*	*%*	*%*	*%*	*%*	*%*	*%*
Parameter	*UEL*	*LEL*	*10% LEL*									
Methane	15	5	0.5	**3.4**	**3.3**	**3.7**	0	0	0	**4.8**	**2**	0

			Sample Location:	*GP16-09*			*GP17-09*			*GP18-09*		
			Sample Date:	*9/18/2009*	*10/14/2009*	*12/10/2009*	*9/18/2009*	*10/14/2009*	*12/10/2009*	*9/18/2009*	*10/14/2009*	*12/10/2009*
			Units:	*%*	*%*	*%*	*%*	*%*	*%*	*%*	*%*	*%*
Parameter	*UEL*	*LEL*	*10% LEL*									
Methane	15	5	0.5	**3.7**	**3.7**	**4.3**	**1.3**	**1.7**	0.1	***26.6***	***23.1***	***20.6***

			Sample Location:	*GP19-09*			*GP20-09*			*GP21-09*		
			Sample Date:	*9/18/2009*	*10/14/2009*	*12/10/2009*	*9/18/2009*	*10/14/2009*	*12/10/2009*	*9/18/2009*	*10/14/2009*	*12/9/2009*
			Units:	*%*	*%*	*%*	*%*	*%*	*%*	*%*	*%*	*%*
Parameter	*UEL*	*LEL*	*10% LEL*									
Methane	15	5	0.5	0.4	0.2	**0.5**	0	0	0	7.1	7.8	2.6

Notes:
Bold values exceed 10% of the LEL
Bold and shaded values exceed the LEL
Bold, shaded, and *italic* values exceed the LEL
UEL = Upper explosive level
LEL = Lower explosive level

TABLE 5
USEPA Soil Vapor Screening Levels
South Dayton Dump and Landfill, Moraine, Ohio

		USEPA Residential SVSL for Further Investigation (i.e., concurrent indoor air and sub-slab soil vapor sampling within 30 days)		USEPA Residential SVSL for Monitoring (i.e., for use with IASLs corresponding to a target ELCR of 10^{-5} or HI of 1 to determine if on-going monitoring is necessary)		USEPA Industrial SVSL for Further Investigation (i.e., concurrent indoor air and sub-slab soil vapor sampling within 30 days)		USEPA Industrial SVSL for Monitoring (i.e., for use with IASLs corresponding to a target ELCR of 10^{-5} or HI of 1 to determine if on-going monitoring is necessary)	
Cas #	Parameter Name	Corresponding to a Target ELCR of 10^{-6} in Indoor Air Assuming a DAF=0.1 (µg/m³)	Corresponding to a Target HI of 0.1 in Indoor Air Assuming a DAF=0.1 (µg/m³)	Corresponding to a Target ELCR of 10^{-5} in Indoor Air Assuming a DAF=0.1 (µg/m³)	Corresponding to a Target HI of 1 in Indoor Air Assuming a DAF=0.1 (µg/m³)	Corresponding to a Target ELCR of 10^{-6} in Indoor Air Assuming a DAF=0.1 (µg/m³)	Corresponding to a Target HI of 0.1 in Indoor Air Assuming a DAF=0.1 (µg/m³)	Corresponding to a Target ELCR of 10^{-5} in Indoor Air Assuming a DAF=0.1 (µg/m³)	Corresponding to a Target HI of 1 in Indoor Air Assuming a DAF=0.1 (µg/m³)
71-55-6	1,1,1-Trichloroethane	--	5,200	--	52,000	--	22,000	--	220,000
79-34-5	1,1,2,2-Tetrachloroethane	0.42	--	4.2	--	2.1	--	21	--
79-00-5	1,1,2-Trichloroethane	1.5	0.21	15	2.1	7.7	0.88	77	8.8
75-34-3	1,1-Dichloroethane	15	--	150	--	77	--	770	--
75-35-4	1,1-Dichloroethene	--	210	--	2,100	--	880	--	8,800
120-82-1	1,2,4-Trichlorobenzene	--	2.1	--	21	--	8.8	--	88
96-12-8	1,2-Dibromo-3-chloropropane (DBCP)	0.0016	0.21	0.016	2.1	0.020	0.88	0.20	8.8
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	0.041	9.4	0.41	94	0.20	39	2.0	390
95-50-1	1,2-Dichlorobenzene	--	210	--	2,100	--	880	--	8,800
107-06-2	1,2-Dichloroethane	0.94	7.3	9.4	73	4.7	31	47	310
78-87-5	1,2-Dichloropropane	2.4	4.2	24	42	12	18	120	180
541-73-1	1,3-Dichlorobenzene[a]	2.2	830	22	8,300	11	3,500	110	35,000
106-46-7	1,4-Dichlorobenzene	2.2	830	22	8,300	11	3,500	110	35,000
78-93-3	2-Butanone (Methyl ethyl ketone) (MEK)	--	5,200	--	52,000	--	22,000	--	220,000
591-78-6	2-Hexanone	--	31	--	310	--	130	--	1,300
108-10-1	4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	--	3,100	--	31,000	--	13,000	--	130,000
67-64-1	Acetone	--	32,000	--	320,000	--	140,000	--	1,400,000
71-43-2	Benzene	3.1	31	31	310	16	130	160	1,300
75-27-4	Bromodichloromethane	0.66	--	6.6	--	3.3	--	33	--
75-25-2	Bromoform	22	--	220	--	110	--	1,100	--
74-83-9	Bromomethane (Methyl bromide)	--	5.2	--	52	--	22	--	220
75-15-0	Carbon disulfide	--	730	--	7,300	--	3,100	--	31,000
56-23-5	Carbon tetrachloride	4.1	100	41	1,000	20	440	200	4,400
108-90-7	Chlorobenzene	--	52	--	520	--	220	--	2,200
75-00-3	Chloroethane	--	10,000	--	100,000	--	44,000	--	440,000
67-66-3	Chloroform (Trichloromethane)	1.1	100	11	1,000	5.3	430	53	4,300
74-87-3	Chloromethane (Methyl chloride)	--	94	--	940	--	390	--	3,900
156-59-2	cis-1,2-Dichloroethene[b]	--	63	--	630	--	260	--	2,600
10061-01-5	cis-1,3-Dichloropropene[c]	6.1	21	61	210	31	88	310	880
110-82-7	Cyclohexane	--	6,300	--	63,000	--	26,000	--	260,000
124-48-1	Dibromochloromethane	0.9	--	9.0	--	4.5	--	45	--
75-71-8	Dichlorodifluoromethane (CFC-12)	--	--	--	--	--	--	--	--
100-41-4	Ethylbenzene	9.7	1,000	97	10,000	49	4,400	490	44,000
98-82-8	Isopropyl benzene	--	420	--	4,200	--	1,800	--	18,000
1634-04-4	Methyl tert butyl ether (MTBE)	94	3,100	940	31,000	470	13,000	4,700	130,000
75-09-2	Methylene chloride	52	1,100	520	11,000	260	4,600	2,600	46,000
91-20-3	Naphthalene	0.72	3.1	7.2	31	3.6	13	36	130
100-42-5	Styrene	--	1,000	--	10,000	--	4,400	--	44,000

TABLE 5
USEPA Soil Vapor Screening Levels
South Dayton Dump and Landfill, Moraine, Ohio

		USEPA Residential SVSL for Further Investigation (i.e., concurrent indoor air and sub-slab soil vapor sampling within 30 days)		USEPA Residential SVSL for Monitoring (i.e., for use with IASLs corresponding to a target ELCR of 10^{-5} or HI of 1 to determine if on-going monitoring is necessary)		USEPA Industrial SVSL for Further Investigation (i.e., concurrent indoor air and sub-slab soil vapor sampling within 30 days)		USEPA Industrial SVSL for Monitoring (i.e., for use with IASLs corresponding to a target ELCR of 10^{-5} or HI of 1 to determine if on-going monitoring is necessary)	
Cas #	Parameter Name	Corresponding to a Target ELCR of 10^{-6} in Indoor Air Assuming a DAF=0.1 (µg/m³)	Corresponding to a Target HI of 0.1 in Indoor Air Assuming a DAF=0.1 (µg/m³)	Corresponding to a Target ELCR of 10^{-5} in Indoor Air Assuming a DAF=0.1 (µg/m³)	Corresponding to a Target HI of 1 in Indoor Air Assuming a DAF=0.1 (µg/m³)	Corresponding to a Target ELCR of 10^{-6} in Indoor Air Assuming a DAF=0.1 (µg/m³)	Corresponding to a Target HI of 0.1 in Indoor Air Assuming a DAF=0.1 (µg/m³)	Corresponding to a Target ELCR of 10^{-5} in Indoor Air Assuming a DAF=0.1 (µg/m³)	Corresponding to a Target HI of 1 in Indoor Air Assuming a DAF=0.1 (µg/m³)
127-18-4	Tetrachloroethene	4.1	280	41	2,800	21	1,200	210	12,000
108-88-3	Toluene	--	5,200	--	52,000	--	22,000	--	220,000
156-60-5	trans-1,2-Dichloroethene	--	63	--	630	--	260	--	2,600
10061-02-6	trans-1,3-Dichloropropene[d]	6.1	21	61	210	31	88	310	880
79-01-6	Trichloroethene[e]	4.3	2.1	43	21	30	8.8	300	88
75-69-4	Trichlorofluoromethane (CFC-11)	--	730	--	7,300	--	3,100	--	31,000
76-13-1	Trifluorotrichloroethane (Freon 113)	--	31,000	--	310,000	--	130,000	--	1,300,000
75-01-4	Vinyl chloride	1.6	100	16	1,000	28	440	280	4,400
1330-20-7	Xylenes (total)	--	100	--	1000	--	440	--	4,400

Notes:
The SVSLs are based on the EPA 2011 Regional Screening Levels (RSLs; June 2011) for Residential Air and Industrial Air.
The SVSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidbook (Oct 2010) default soil-vapor-to-indoor-air attenuation factor of 0.1.
— = EPA RSL not available
SVSL = Soil Vapor Screening Level
ELCR = Estimated Lifetime Cancer Risk
HI = Hazard Index
DAF = Default Attenuation Factor
[a] = An RSL is not available for 1,3-dichlorobenzene; the RSL for 1,4-dichlorobenzene was considered an evaluation surrogate for 1,3-dichlorobenzene.
[b] = An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.
[c] = An RSL is not available for cis-1,3-dichloropropene; the RSL for 1,3-dichloropropene was considered an evaluation surrogate for cis-1,3-dichloropropene.
[d] = An RSL is not available for trans-1,3-dichloropropene; the RSL for 1,3-dichloropropene was considered an evaluation surrogate for trans-1,3-dichloropropene.
[e] = The SVSLs for trichloroethene are based on the updated IRIS toxicity value (September 2011) and the cancer-based SVSL includes an adjustment for the mutagenic mode of action for kidney cancer.

TABLE 6

USEPA Crawl Space Air Screening Levels

South Dayton Dump and Landfill, Moraine, Ohio

		USEPA Residential CSSL for Further Investigation (i.e., concurrent indoor and crawl space air sampling within 30 days)		USEPA Industrial CSSL for Further Investigation (i.e., concurrent indoor and crawl space air sampling within 30 days)	
Cas #	Parameter Name	Corresponding to a Target ELCR of 10^{-5} in Indoor Air Assuming a DAF=1 (µg/m³)	Corresponding to a Target HI of 1 in Indoor Air Assuming a DAF=1 (µg/m³)	Corresponding to a Target ELCR of 10^{-5} in Indoor Air Assuming a DAF=1 (µg/m³)	Corresponding to a Target HI of 1 in Indoor Air Assuming a DAF=1 (µg/m³)
71-55-6	1,1,1-Trichloroethane	--	5,200	--	22,000
79-34-5	1,1,2,2-Tetrachloroethane	0.42	--	2.1	--
79-00-5	1,1,2-Trichloroethane	1.5	0.21	7.7	0.88
75-34-3	1,1-Dichloroethane	15	--	77	--
75-35-4	1,1-Dichloroethene	--	210	--	880
120-82-1	1,2,4-Trichlorobenzene	--	2.1	--	8.8
96-12-8	1,2-Dibromo-3-chloropropane (DBCP)	0.0016	0.21	0.02	0.88
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	0.041	9.4	0.2	39
95-50-1	1,2-Dichlorobenzene	--	210	--	880
107-06-2	1,2-Dichloroethane	0.94	7.3	4.7	31
78-87-5	1,2-Dichloropropane	2.4	4.2	12	18
541-73-1	1,3-Dichlorobenzene[a]	2.2	830	11	3,500
106-46-7	1,4-Dichlorobenzene	2.2	830	11	3,500
78-93-3	2-Butanone (Methyl ethyl ketone) (MEK)	--	5,200	--	22,000
591-78-6	2-Hexanone	--	31	--	130
108-10-1	4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	--	3,100	--	13,000
67-64-1	Acetone	--	32,000	--	140,000
71-43-2	Benzene	3.1	31	16	130
75-27-4	Bromodichloromethane	0.66	--	3.3	--
75-25-2	Bromoform	22	--	110	--
74-83-9	Bromomethane (Methyl bromide)	--	5.2	--	22
75-15-0	Carbon disulfide	--	730	--	3,100
56-23-5	Carbon tetrachloride	4.1	100	20	440
108-90-7	Chlorobenzene	--	52	--	220
75-00-3	Chloroethane	--	10,000	--	44,000
67-66-3	Chloroform (Trichloromethane)	1.1	100	5.3	430
74-87-3	Chloromethane (Methyl chloride)	--	94	--	390
156-59-2	cis-1,2-Dichloroethene[b]	--	63	--	260
10061-01-5	cis-1,3-Dichloropropene[c]	6.1	21	31	88
110-82-7	Cyclohexane	--	6,300	--	26,000
124-48-1	Dibromochloromethane	0.9	--	4.5	--
75-71-8	Dichlorodifluoromethane (CFC-12)	--	--	--	--
100-41-4	Ethylbenzene	9.7	1,000	49	4,400
98-82-8	Isopropyl benzene	--	420	--	1,800

TABLE 6

USEPA Crawl Space Air Screening Levels

South Dayton Dump and Landfill, Moraine, Ohio

		USEPA Residential CSSL for Further Investigation (i.e., concurrent indoor and crawl space air sampling within 30 days)		USEPA Industrial CSSL for Further Investigation (i.e., concurrent indoor and crawl space air sampling within 30 days)	
Cas #	Parameter Name	Corresponding to a Target ELCR of 10^{-5} in Indoor Air Assuming a DAF=1 (µg/m³)	Corresponding to a Target HI of 1 in Indoor Air Assuming a DAF=1 (µg/m³)	Corresponding to a Target ELCR of 10^{-5} in Indoor Air Assuming a DAF=1 (µg/m³)	Corresponding to a Target HI of 1 in Indoor Air Assuming a DAF=1 (µg/m³)
1634-04-4	Methyl tert butyl ether (MTBE)	94	3,100	470	13,000
75-09-2	Methylene chloride	52	1,100	260	4,600
91-20-3	Naphthalene	0.72	3.1	3.6	13
100-42-5	Styrene	--	1,000	--	4,400
127-18-4	Tetrachloroethene	4.1	280	21	1,200
108-88-3	Toluene	--	5,200	--	22,000
156-60-5	trans-1,2-Dichloroethene	--	63	--	260
10061-02-6	trans-1,3-Dichloropropene[d]	6.1	21	31	88
79-01-6	Trichloroethene[e]	4.3	2.1	30	8.8
75-69-4	Trichlorofluoromethane (CFC-11)	--	730	--	3,100
76-13-1	Trifluorotrichloroethane (Freon 113)	--	31,000	--	130,000
75-01-4	Vinyl chloride	1.6	100	28	440
1330-20-7	Xylenes (total)	--	100	--	440

Notes:

The CSSLs are based on the EPA 2011 Regional Screening Levels (RSLs; June 2011) for Residential Air and Industrial Air.

The CSSLs were derived from the USEPA (Jun 2011) RSLs by applying the USEPA Region 5 Vapor Intrusion Guidbook (Oct 2010) default crawl-space-air-to-indoor-air attenuation factor of 1.

— = EPA RSL not available

CSSL = Crawl Space Air Screening Level

ELCR = Estimated Lifetime Cancer Risk

HI = Hazard Index

DAF = Default Attenuation Factor

[a] = An RSL is not available for 1,3-dichlorobenzene; the RSL for 1,4-dichlorobenzene was considered an evaluation surrogate for 1,3-dichlorobenzene.

[b] = An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.

[c] = An RSL is not available for cis-1,3-dichloropropene; the RSL for 1,3-dichloropropene was considered an evaluation surrogate for cis-1,3-dichloropropene.

[d] = An RSL is not available for trans-1,3-dichloropropene; the RSL for 1,3-dichloropropene was considered an evaluation surrogate for trans-1,3-dichloropropene.

[e] = The CSSLs for trichloroethene are based on the updated IRIS toxicity value (September 2011) and the cancer-based CSSL includes an adjustment for the mutagenic mode of action for kidney cancer.

TABLE 7
USEPA Indoor Air Screening Levels
South Dayton Dump and Landfill, Moraine, Ohio

		USEPA Residential IASL for Mitigation		**USEPA Residential IASL for High Priority / Rapid Response (i.e., within a few weeks) Mitigation**		**USEPA Industrial IASL for Mitigation**		**USEPA Industrial IASL for High Priority / Rapid Response (i.e., within a few weeks) Mitigation**	
Cas #	**Parameter Name**	**Corresponding to a Target ELCR of 10^{-5} in Indoor Air (µg/m³)**	**Corresponding to a Target HI of 1 in Indoor Air (µg/m³)**	**Corresponding to a Target ELCR of 10^{-4} in Indoor Air (µg/m³)**	**Corresponding to a Target HI of 10 in Indoor Air (µg/m³)**	**Corresponding to a Target ELCR of 10^{-5} in Indoor Air (µg/m³)**	**Corresponding to a Target HI of 1 in Indoor Air (µg/m³)**	**Corresponding to a Target ELCR of 10^{-4} in Indoor Air (µg/m³)**	**Corresponding to a Target HI of 10 in Indoor Air (µg/m³)**
71-55-6	1,1,1-Trichloroethane	--	5,200	--	52,000	--	22,000	--	220,000
79-34-5	1,1,2,2-Tetrachloroethane	0.42	--	4.2	--	2.1	--	21	--
79-00-5	1,1,2-Trichloroethane	1.5	0.21	15	2.1	7.7	0.88	77	8.8
75-34-3	1,1-Dichloroethane	15	--	150	--	77	--	770	--
75-35-4	1,1-Dichloroethene	--	210	--	2,100	--	880	--	8,800
120-82-1	1,2,4-Trichlorobenzene	--	2.1	--	21	--	8.8	--	88
96-12-8	1,2-Dibromo-3-chloropropane (DBCP)	0.0016	0.21	0.016	2.1	0.02	0.88	0.2	8.8
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	0.041	9.4	0.41	94	0.2	39	2	390
95-50-1	1,2-Dichlorobenzene	--	210	--	2,100	--	880	--	8,800
107-06-2	1,2-Dichloroethane	0.94	7.3	9.4	73	4.7	31	47	310
78-87-5	1,2-Dichloropropane	2.4	4.2	24	42	12	18	120	180
541-73-1	1,3-Dichlorobenzene[a]	2.2	830	22	8,300	11	3,500	110	35,000
106-46-7	1,4-Dichlorobenzene	2.2	830	22	8,300	11	3,500	110	35,000
78-93-3	2-Butanone (Methyl ethyl ketone) (MEK)	--	5,200	--	52,000	--	22,000	--	220,000
591-78-6	2-Hexanone	--	31	--	310	--	130	--	1,300
108-10-1	4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	--	3,100	--	31,000	--	13,000	--	130,000
67-64-1	Acetone	--	32,000	--	320,000	--	140,000	--	1,400,000
71-43-2	Benzene	3.1	31	31	310	16	130	160	1,300
75-27-4	Bromodichloromethane	0.66	--	6.6	--	3.3	--	33	--
75-25-2	Bromoform	22	--	220	--	110	--	1,100	--
74-83-9	Bromomethane (Methyl bromide)	--	5.2	--	52	--	22	--	220
75-15-0	Carbon disulfide	--	730	--	7,300	--	3,100	--	31,000
56-23-5	Carbon tetrachloride	4.1	100	41	1,000	20	440	200	4,400
108-90-7	Chlorobenzene	--	52	--	520	--	220	--	2,200
75-00-3	Chloroethane	--	10,000	--	100,000	--	44,000	--	440,000
67-66-3	Chloroform (Trichloromethane)	1.1	100	11	1,000	5.3	430	53	4,300
74-87-3	Chloromethane (Methyl chloride)	--	94	--	940	--	390	--	3,900
156-59-2	cis-1,2-Dichloroethene[b]	--	63	--	630	--	260	--	2,600
10061-01-5	cis-1,3-Dichloropropene[c]	6.1	21	61	210	31	88	310	880
110-82-7	Cyclohexane	--	6,300	--	63,000	--	26,000	--	260,000
124-48-1	Dibromochloromethane	0.9	--	9	--	4.5	--	45	--
75-71-8	Dichlorodifluoromethane (CFC-12)	--	--	--	--	--	--	--	--
100-41-4	Ethylbenzene	9.7	1,000	97	10,000	49	4,400	490	44,000
98-82-8	Isopropyl benzene	--	420	--	4,200	--	1,800	--	18,000
1634-04-4	Methyl tert butyl ether (MTBE)	94	3,100	940	31,000	470	13,000	4,700	130,000
75-09-2	Methylene chloride	52	1,100	520	11,000	260	4,600	2,600	46,000
91-20-3	Naphthalene	0.72	3.1	7.2	31	3.6	13	36	130
100-42-5	Styrene	--	1,000	--	10,000	--	4,400	--	44,000
127-18-4	Tetrachloroethene	4.1	280	41	2,800	21	1,200	210	12,000
108-88-3	Toluene	--	5,200	--	52,000	--	22,000	--	220,000

TABLE 7

USEPA Indoor Air Screening Levels

South Dayton Dump and Landfill, Moraine, Ohio

		USEPA Residential IASL for Mitigation		USEPA Residential IASL for High Priority / Rapid Response (i.e., within a few weeks) Mitigation		USEPA Industrial IASL for Mitigation		USEPA Industrial IASL for High Priority / Rapid Response (i.e., within a few weeks) Mitigation	
Cas #	Parameter Name	Corresponding to a Target ELCR of 10^{-5} in Indoor Air (µg/m³)	Corresponding to a Target HI of 1 in Indoor Air (µg/m³)	Corresponding to a Target ELCR of 10^{-4} in Indoor Air (µg/m³)	Corresponding to a Target HI of 10 in Indoor Air (µg/m³)	Corresponding to a Target ELCR of 10^{-5} in Indoor Air (µg/m³)	Corresponding to a Target HI of 1 in Indoor Air (µg/m³)	Corresponding to a Target ELCR of 10^{-4} in Indoor Air (µg/m³)	Corresponding to a Target HI of 10 in Indoor Air (µg/m³)
156-60-5	trans-1,2-Dichloroethene	--	63	--	630	--	260	--	2,600
10061-02-6	trans-1,3-Dichloropropene[d]	6.1	21	61	210	31	88	310	880
79-01-6	Trichloroethene[e]	4.3	2.1	43	21	30	8.8	300	88
75-69-4	Trichlorofluoromethane (CFC-11)	--	730	--	7,300	--	3,100	--	31,000
76-13-1	Trifluorotrichloroethane (Freon 113)	--	31,000	--	310,000	--	130,000	--	1,300,000
75-01-4	Vinyl chloride	1.6	100	16	1,000	28	440	280	4,400
1330-20-7	Xylenes (total)	--	100	--	1,000	--	440	--	4,400

Notes:

The IASLs are based on the EPA 2011 Regional Screening Levels (RSLs; June 2011) for Residential Air and Industrial Air.

— = EPA RSL not available

IASL = Indoor Air Screening Level

ELCR = Estimated Lifetime Cancer Risk

HI = Hazard Index

[a] = An RSL is not available for 1,3-dichlorobenzene; the RSL for 1,4-dichlorobenzene was considered an evaluation surrogate for 1,3-dichlorobenzene.

[b] = An RSL is not available for cis-1,2-dichloroethene; the RSL for trans-1,2-dichloroethene was considered an evaluation surrogate for cis-1,2-dichloroethene.

[c] = An RSL is not available for cis-1,3-dichloropropene; the RSL for 1,3-dichloropropene was considered an evaluation surrogate for cis-1,3-dichloropropene.

[d] = An RSL is not available for trans-1,3-dichloropropene; the RSL for 1,3-dichloropropene was considered an evaluation surrogate for trans-1,3-dichloropropene.

[e] = The IASLs for trichloroethene are based on the updated IRIS toxicity value (September 2011) and the cancer-based IASL includes an adjustment for the mutagenic mode of action for kidney cancer.

TABLE 8

SOIL GAS AND INDOOR AIR PARAMETER LISTS AND TARGETED QUANTITATION LIMITS
VAPOR INTRUSION INVESTIGATION
SOUTH DAYTON DUMP AND LANDFILL SITE
MORAINE, OHIO

	Industrial Sub-slab soil vapor screening levels for further VI Investigation (ELCR = 10^{-6}, HQ=0.1; DAF=10)	*Residential Sub-slab soil vapor screening levels for further VI Investigation (ELCR = 10^{-6}, HQ=0.1; DAF=10)*	*Industrial Indoor Air Screening Levels for Mitigation (ELCR = 10^{-5}, HQ=1.0)*	*Residential Indoor Air Screening Levels for Mitigation (ELCR = 10^{-5}, HQ=1.0)*	*Test America TO-15 Routine Reporting Detection Limits (RDL)*	*Test America TO-15 Routine Method Detection Limits (MDL)*	*Test America Low-Level RDL*
Screening Level specifier:	a	b	c	d			
Parameter [1]							
1,1,1-Trichloroethane	22,000	5,200	22,000	5,200	1.1	0.19	0.05
1,1,2,2-Tetrachloroethane	2.1	0.42	2.1	0.42	**1.4**[bd]	0.27	0.07
1,1,2-Trichloroethane	7.7	1.5	7.7	1.5	1.1	0.1	0.05
1,1-Dichloroethane	77	15	77	15	0.81	0.14	0.04
1,1-Dichloroethene	880	210	880	210	0.79	0.12	0.04
1,2,4-Trichlorobenzene	8.8	2.1	8.8	2.1	**3.7**[bd]	0.37	NA
1,2-Dibromo-3-chloropropane (DBCP)	0.02	0.0016	0.02	0.0016	NA	NA	NA
1,2-Dibromoethane (Ethylene dibromide)	0.2	0.041	0.2	0.041	**1.5**[abcdf]	**0.14**[bd]	**0.08**[bd]
1,2-Dichlorobenzene	880	210	880	210	1.2	0.29	NA
1,2-Dichloroethane	4.7	0.94	4.7	0.94	0.81	0.13	0.08
1,2-Dichloropropane	12	2.4	12	2.4	0.92	0.065	0.09
1,3-Dichlorobenzene	11	2.2	11	2.2	1.2	0.26	NA
1,4-Dichlorobenzene	11	2.2	11	2.2	1.2	0.26	NA
2-Butanone (Methyl ethyl ketone) (MEK)	22,000	5,200	22,000	5,200	1.5	0.05	NA
2-Hexanone	130	31	130	31	2	0.16	NA
4-Methyl-2-pentanone (Methyl isobutyl ke	13,000	3,100	13,000	3,100	2	0.11	NA
Acetone	140,000	32,000	140,000	32,000	12	0.11	NA
Benzene	16	3.1	16	3.1	0.64	0.058	0.03
Bromodichloromethane	3.3	0.66	3.3	0.66	**1.3**[bd]	0.19	0.07
Bromoform	110	22	110	22	2.1	0.2	0.10
Bromomethane (Methyl bromide)	22	5.2	22	5.2	0.78	0.047	NA
Carbon disulfide	3,100	730	3,100	730	1.6	0.21	NA
Carbon tetrachloride	20	4.1	20	4.1	1.3	0.21	0.06
Chlorobenzene	220	52	220	52	0.92	0.092	NA
Chloroethane	44,000	10,000	44,000	10,000	1.3	0.042	0.05
Chloroform (Trichloromethane)	5.3	1.1	5.3	1.1	0.98	0.15	0.05
Chloromethane (Methyl chloride)	390	94	390	94	1	0.027	NA
cis-1,2-Dichloroethene	63	260	63	260	0.79	0.056	0.04
cis-1,3-Dichloropropene	31	6.1	31	6.1	0.91	0.073	0.05
Cyclohexane	26,000	6,300	26,000	6,300	0.69	0.13	0.03
Dibromochloromethane	4.5	0.9	4.5	0.9	**1.7**[bd]	0.18	0.10
Dichlorodifluoromethane (CFC-12)	440	100	440	100	2.5	0.19	0.05

TABLE 8

SOIL GAS AND INDOOR AIR PARAMETER LISTS AND TARGETED QUANTITATION LIMITS
VAPOR INTRUSION INVESTIGATION
SOUTH DAYTON DUMP AND LANDFILL SITE
MORAINE, OHIO

	Industrial Sub-slab soil vapor screening levels for further VI Investigation (ELCR = 10^{-6}, HQ=0.1; DAF=10)	*Residential Sub-slab soil vapor screening levels for further VI Investigation (ELCR = 10^{-6}, HQ=0.1; DAF=10)*	*Industrial Indoor Air Screening Levels for Mitigation (ELCR = 10^{-5}, HQ=1.0)*	*Residential Indoor Air Screening Levels for Mitigation (ELCR = 10^{-5}, HQ=1.0)*	*Test America TO-15 Routine Reporting Detection Limits (RDL)*	*Test America TO-15 Routine Method Detection Limits (MDL)*	*Test America Low-Level RDL*
Screening Level specifier:	a	b	c	d			
Ethylbenzene	49	9.7	49	9.7	0.87	0.096	0.04
Isopropyl benzene	1,800	420	1,800	420	0.98	0.15	NA
Methyl tert butyl ether (MTBE)	470	94	470	94	0.72	0.058	0.04
Methylene chloride	260	52	260	52	1.7	0.045	0.69
Naphthalene	3.6	0.72	3.6	0.72	**2.6**[bd]	0.45	0.068
Styrene	4,400	1,000	4,400	1,000	0.85	0.13	NA
Tetrachloroethene	21	4.1	21	4.1	1.4	0.075	0.07
Toluene	22,000	5,200	22,000	5,200	0.75	0.068	0.04
trans-1,2-Dichloroethene	260	63	260	63	0.79	0.13	0.04
trans-1,3-Dichloropropene	31	6.1	31	6.1	0.91	0.091	0.05
Trichloroethene	8.8	2.1	8.8	2.1	1.1	0.16	0.05
Trichlorofluoromethane (CFC-11)	3,100	730	3,100	730	1.1	0.19	0.06
Trifluorotrichloroethane (Freon 113)	130,000	31,000	130,000	31,000	1.5	0.077	NA
Vinyl chloride	28	1.6	28	1.6	0.51	0.074	0.05
Xylenes (total)	440	100	440	100	0.87	0.096	NA
Methane	NV	NV	NV	NV			

Notes:

[1] = All concentrations are expressed in units of micrograms per cubic metre ($\mu g/m^3$) unless otherwise noted.
ELCR = Excess Lifetime Cancer Risk
HQ = Hazard Quotient
DAF = Dilution Attenuation Factor; applied in accordance with Appendix F of the OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils, (USEPA, 2002)
MDL = Method Detection Limit
NA = Not Analyzed
RDL = Reporting Detection Limit
$\boxed{}$ = Greater than specified screening level

APPENDIX A

BUILDING PHYSICAL SURVEY QUESTIONNAIRES AND PHOTOGRAPHS

(Provided electronically by Conestoga-Rovers & Associates with the August 9, 2011 work plan; the material was not modified.)

APPENDIX B

STANDARD OPERATING PROCEDURES

APPENDIX B-1
STANDARD OPERATING PROCEDURE
FOR INSTALLING AND SAMPLING SUB-SLAB SOIL VAPOR PROBES

TABLE OF CONTENTS

1.0 PLANNING AND PREPARATION

Prior to installing a sub-slab soil vapor probe:

1. Review the Work Plan and Health and Safety Plan (HASP) with the Project Coordinator. Understand the existing site geologic/hydrogeologic conditions such as the type of soil, level of water table or perched groundwater table, and properties of refuse (if installing a probe in a landfill) such as depth, leachate levels or perched leachate levels. Know the seasonally high and low water table and leachate elevations, and know if perched conditions exist.
2. Assemble all required equipment, materials, log books, and forms.
3. Obtain information on the probes to be installed to ensure a complete understanding of the task to be performed. Required information for installation includes knowing the type of soil vapor probe construction materials that are to be used, including knowing the diameter of the probe, and planned location for each probe.
4. Determine the type of analyses that are required from the probes after installation, and the type of vapor monitoring that is required during the drilling and installation of the probe.
5. Arrange access to the site, especially if the property owner is not our client. Obtain all necessary keys. Also consider site conditions (e.g., is snow removal required?).
6. Determine drilling or property access notification requirements with the Project Coordinator. Notify the client, landowner, and appropriate regulatory agencies and complete utility clearance activities in accordance with the FSP.
7. Review the Building Physical Survey Questionnaire for the building/property and determine if conditions have changed and if the form needs to be updated.

2.0 EQUIPMENT DECONTAMINATION

Prior to use between sub-slab soil vapor probe locations, drilling and sampling equipment must be decontaminated in accordance with the Work Plan, the Quality Assurance Project Plan (QAPP), or the methods presented in the following section.

The minimal procedures for decontamination of drilling equipment are:

1. Hot water and detergent wash (brushing as necessary to remove particulate matter)

2. Potable, hot water rinse

Cover clean equipment with clean plastic sheeting to prevent contact with foreign materials.

All canisters will be cleaned in accordance with United States Environmental Protection Agency (USEPA) Method TO-15 and documentation of the cleaning activities will be obtained from the laboratory.

3.0 INSTALLATION PROCEDURES - SUB-SLAB SOIL VAPOR PROBES

Sub-slab soil vapor probes allow for collection of soil vapor samples from directly beneath the slab of a building. Note that sub-slab soil vapor probes are not recommended when groundwater is present directly below the slab, as drilling through the slab could allow groundwater to enter the building.
A summary of the steps involved in the installation of sub-slab soil vapor probes is presented below:

1. Prior to drilling holes into the building slab, the location of utilities (e.g., gas, electrical, water, and sewer lines, etc.) within a 5-foot radius of the proposed probe locations will be identified by a private utility location contractor with ground penetrating radar (GPR). Avoid installing sub-slab soil vapor probes within 5 feet from where utilities penetrate the slab because these may be entry points for downward indoor air migration through the slab during sub-slab soil vapor sampling.
2. Sub-slab soil vapor probes will be installed at a minimum distance of 5 feet from exterior building walls.
3. Spark-free drill bits will be used when drilling through the slab to prevent potential explosion hazards if methane is present at significant concentrations in sub-slab soil vapor.
4. A rotary hammer drill or equivalent equipment will be used to drill a "shallow" (approximately 2-inch [5.0 centimeters (cm)] deep) inner or pilot hole (3/8 inch [9.5 millimeters (mm)] in diameter]) into the slab.
5. Using the 3/8-inch inner hole as the center, drill a 1-inch (2.5-cm) diameter outer hole to a depth of 1 3/8 inches. Cutting may be removed using a towel moistened with distilled water or portable vacuum cleaner.
4. Continue drilling the 3/8-inch inner hole through the slab, to a depth of 3 inches into the sub-slab material. Cuttings may be removed using a towel moistened with distilled water or portable vacuum cleaner.
5. Chromatography grade 316 stainless steel tubing will be cut to a length that allows the probe to reach past the bottom of the outer hole, through the slab, and into the open cavity below the slab (sub-slab). Record length of the stainless steel tubing. To avoid obstruction of the probe tube, ensure it does not contact the sub-slab bedding material. The tubing will be 1/4 inch (6.4 mm) outer diameter (O.D.) (Swagelok® part number SS-T4-S-035-20).
6. The compression fittings will be stainless steel (1/4-inch O.D. and 1/8-inch NPT) Swagelok® female thread connectors (Swagelok® part number SS-400-7-2). The probes will be constructed prior to drilling to minimize exposure time, or venting, of the sub-slab bedding material through the open hole. The probe length may be adjusted after drilling (i.e., when the exact thickness of the slab is determined) with a tubing cutter.
7. Attach the length of 1/4-inch O.D. stainless steel tubing to the female connector of with the Swagelok® nut and ferrule set (Swagelok® part number SS-400-NFSET). Tighten the nut.
8. Insert the 1/4-inch brass probe cap (Napa Auto Parts #3150X2) into the female connector. Tighten the cap. **Do not over tighten**.
9. Wrap the end of the probe tubing (approximately 2 to 3 inches from the bottom of the probe) with Teflon® tape to create a seal between the outer and inner holes in order to prevent the seal material from clogging the probe.

10. The sub-slab soil vapor probe will be placed in center of the outer hole so that the top of the female connector is flush with the top of the floor.
11. The top of the probe will have a recessed brass probe cap. Portland cement slurry will be injected or pushed into the annular space between the probe and the outer hole. The cement will be allowed to dry for at least 24 hours prior to sampling.

3.1 INSTALLATION DOCUMENTATION

Details of each sub-slab soil vapor probe installation should be recorded within a standard CRA field book. Details should include:

☐ Borehole depth

☐ Slab thickness

☐ Sub-slab soil vapor probe material

☐ Sub-slab soil vapor probe length

☐ Sub-slab soil vapor probe diameter

☐ Sub-slab vapor probe location (distance from the closest two exterior perpendicular walls)

☐ Cement slurry seal detail

☐ Interior temperature

☐ Date and time installed

Each sub-slab soil vapor probe must be permanently marked to identify the sub-slab soil vapor probe number designation.

4.0 RESPIRATORY PROTECTION

The HASP must be followed with regard to respiratory protection.

5.0 FOLLOW-UP ACTIVITIES

Once the sub-slab soil vapor probe(s) have been completed, the following activities need to be done:

1. Conduct initial monitoring round of the soil vapor probes
2. Sub-slab soil vapor probe locations will be accurately plotted on the site plan, since boring locations may change in the field due to utility interferences or other conditions
3. Tabulate sub-slab soil vapor probe details
4. A summary write-up on field activities including, but not necessarily limited to such items as drilling method(s), construction material, etc.
5. Field book will be kept at the appropriate CRA office

6.0 FIELD INSTRUMENTATION CALIBRATION

Sampling or monitoring equipment used in the sub-slab soil vapor sampling program to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specification and requirements. Field calibration of the photoionization detector (PID) meter will be performed each day prior to sampling activities. Calibration of the GEM2000 Landfill Gas Meter and the Dielectric Helium MGD-2002 Detector will be performed by the equipment rental company.

The vacuum gauge used to measure canister vacuum will be calibrated and provided by the laboratory. The vacuum gauge will be returned to the laboratory for the laboratory to obtained vacuum measurements prior to sample analysis (checking canister integrity was maintained during shipment). Using a common vacuum gauge will avoid variations in vacuum measurements that can arise due to using different vacuum gauges.

7.0 SUB-SLAB SOIL VAPOR SAMPLING PROTOCOL

The following sections describe the protocol for sub-slab soil vapor sampling from permanent sub-slab soil vapor probes. For evaluating vapor intrusion, permanent sub-slab soil vapor probes are preferable to allow for multiple sub-slab soil vapor sampling events. More than one sub-slab soil vapor sampling event is often required when assessing vapor intrusion to address seasonal variations and temporal variability commonly observed in sub-slab soil vapor concentrations.

Sub-slab soil vapor sampling should commence a minimum of 24 hours following installation of the sub-slab soil vapor probes, to allow time for disturbances created by drilling to dissipate and allow the formation to return to an equilibrium condition. In fine-grained soil conditions, consideration should be given to allowing a greater amount of time for equilibrium conditions to become re-established (e.g., 72 hours).

A summary of the steps involved in sub-slab soil vapor sampling is presented below:

1. Sub-slab soil vapor samples for assessing the vapor intrusion pathway will be collected using certified clean 6-liter Summa™ canisters. The canisters will be pre-cleaned at the laboratory in accordance with USEPA's TO-15 method and documentation of the cleaning activities will be provided by the laboratory. The canisters may be either individually or batch certified.
2. CRA will collect sub-slab soil vapor samples within commercial/industrial buildings and residences using laboratory calibrated flow regulation devices set to sample collection times of 8 and 24 hours, respectively.
3. A vacuum gauge will be supplied by the laboratory and used during sample collection to measure the initial canister vacuum, canister vacuum during sample collection, and residual canister vacuum at the end of sample collection. The vacuum gauge will be returned to the laboratory and used by the laboratory to measure the residual canister vacuum upon receipt of the canisters by the laboratory. Using the same vacuum gauge throughout the entire sampling process will eliminate discrepancies between vacuum measurements that can arise from using different gauges with a potentially different sensitivity and/or calibration.
4. Wrap one layer of Teflon® thread tape onto the NPT end of the male connector Swagelok® part number SS-400-1-2).
5. Remove the 1/4-inch brass probe cap from the female connector.
6. To ensure that the probe has not been blocked by the collapse of the inner hole below the end of the stainless steel tubing, a stainless steel rod (1/8-inch diameter) may be passed through the female connector and the stainless steel tubing. The rod should pass freely to a depth greater than the length of the stainless steel tubing, indicating an open space or loosely packed soil below the end of the stainless steel tubing. Either condition should allow a soil vapor sample to be collected.

If the probe appears blocked, the stainless steel rod may be used as a ramrod in an attempt to open the probe. If the probe cannot be opened, the probe should be reinstalled or a new probe installed in an alternate location.

1. Screw and tighten the male connector into the female connector. **Do not over tighten**.
2. Attach a length of 1/4-inch OD Teflon® tubing to the male connector with a Swagelok® nut and ferrule set.
3. Connect the Teflon® tubing to a valve (Swagelok® part number SS-4P4) so that the lung box can be disconnected without introducing indoor air into the probe). Fresh tubing will be used for each sample. Connect the valve to another piece of Teflon® tubing with a Swagelok® nut and ferrule set.
4. Place the helium enclosure over the probe so that only the Teflon® tubing sticks out (the valve will be contained inside of the enclosure). The helium enclosure is constructed of a small bowl or plastic container with foam tape around the rim (to create a seal with the slab) and three holes (one for the sample tubing, one for the influent helium tubing and one for the effluent helium tubing [so that pressure does not building up in the enclosure]).
5.
6. Connect the Teflon® tubing to the lung box with a Swagelok® nut and ferrule set.
7. Purge the sub-slab soil vapor probe and perform the tracer test. The sub-slab soil vapor probe is purged to remove the stagnant air in the sampling assembly tubes and sub-slab soil vapor probe casing which would dilute the sample. The tracer test is performed to ensure that ambient air is not drawn down the sub-slab soil vapor probe annulus through an incomplete seal between the formation and the sub-slab soil vapor probe casing during sub-slab soil vapor sample collection. The tracer test is performed by releasing a tracer compound consisting of 99.99% pure helium (i.e., not balloon grade which may contain trace volatile organic compounds [VOCs]) at ground surface immediately around the sub-slab soil vapor probe surface casing and then testing the purged sub-slab soil vapor for helium.
   a. Flood the helium enclosure with helium.
   b. Purge 1 to 2 liters of sub-slab soil vapor into the Tedlar bag contained inside the lung box at 200 mL/min. One liter of sub-slab soil vapor will be greater than three volumes from the sub-slab soil vapor probe assembly (probe and attached Teflon® tubing); however the additional purged sub-slab soil vapor is necessary for leak testing. Record the purge data (purging rate, duration of purging, purged volume).
   c. Take the Tedlar bag outside of the building (to avoid introducing potentially contaminated sub-slab soil vapor to indoor air) and connect it to a Dielectric Helium MGD-2002 Detector. The helium concentration in the purged sub-slab soil vapor should be less than 1percent (10,000 ppm); if it is greater than 1 percent the probe is leaking and should be repaired or elevated methane concentrations (above approximately 5 percent) in the sub-slab soil vapor are interfering with the helium detector. Use the LandTec GEM 2000 Landfill Gas Meter to measure methane (CH_4) concentrations in the purged sub-slab soil vapor to determine if CH_4 is interfering. If methane is not present at concentrations above approximately 5 percent, then the helium readings are not biased. If methane is present at concentrations above approximately 5 percent then the Summa canister will be analyzed for helium by the analytical laboratory. The probe can be temporarily patched with VOC-free modeling clay and then patched with Portland cement slurry after sampling is completed. Once the probe is temporarily patched it must be leak tested again. The probe may have to be re-installed if it continues to fail the leak test. Record the helium leak test results.
   d. Connect the Tedlar bag to a PID to obtain field measurements of total VOCs. If high concentrations are detected notify the analytical laboratory so it can dilute the same prior to analysis. Record the total VOC measurement.
8. Collect an additional 1 liter of sub-slab soil vapor into the Tedlar bag using the lung box. Take the Tedlar bag outside and connect it to the RKI GX-2003 or LandTec GEM 2000 Landfill Gas

Meter to measure oxygen (O_2), carbon dioxide (CO_2), CH_4 concentrations in the sub-slab soil vapor. Record the measurements of O_2, CO_2 and CH_4.

9. Following purging and leak checking, close the valve and remove the lung box. Attach the Summa™ canister (with attached flow controller and pressure gauge) to the valve with Teflon® tubing and a Swagelok® nut and ferrule set. Open the valve to the Summa™ canister and record the initial pressure and time. Then open the valve to the probe to draw the sub-slab soil vapor sample into the canister.
10. The canister pressures will be checked periodically during the sample collection period to ensure they are collecting at the desired flow rate. At a minimum the canisters will be checked several hours prior to the expected end time so that the final canister pressure does not reach zero.
11. Some residual vacuum should be left in each canister following sample collection. A maximum residual vacuum of 10 inches Hg is allowed. A canister residual vacuum above this value will require continued sampling until vacuum reading is below this threshold, unless the vacuum remains above 10 inches Hg for more than 30 minutes. A minimum 1-inch Hg residual vacuum will be required for the sample to be considered valid, or the sampling will be repeated using a fresh Summa™ canister.
12. The canister valve will be closed fully at the end of the sample period, and the safety cap will be secured on the canister. Record the end time and final pressure. If there is evidence of canister disturbance during the sample collection, this will also be recorded. Record the final canister pressure and sample end time.
13. Following sample collection, disconnect the canister and re-attach the lung box. Collect 1 liter of sub-slab soil vapor into a Tedlar bag using the lung box. Take the Tedlar bag outside and connect it to the LandTec GEM 2000 Landfill Gas Meter to measure O_2, CO_2, CH_4 concentrations in the sub-slab soil vapor. Record the measurements of O_2, CO_2 and CH_4. In addition, connect the Tedlar bag to a PID to obtain field measurements of total VOCs. If high concentrations are detected notify the analytical laboratory so it can dilute the same prior to analysis. Record the post sample total VOC measurement.
14. After sample collection, remove the male connector from the probe and reinstall the probe cap. Do not over tighten.
15. The canisters will be labeled noting the unique sample designation number, date, time, and sampler's initials. A bound field logbook will be maintained to record all sub-slab soil vapor sampling data. The sub-slab soil vapor unique sample designation numbers will have the following format:

    SS-38443-MMDDYY-XX-NNN

    Where:
    SS - Designates sub-slab soil vapor sample
    38443 - Project reference number
    MMDDYY - Designates date of collection presented as month, day, and year
    XX - Sampler's first and last initials
    NNN - Sequential sample number for event starting with 001

16. The canisters will be listed on the chain-of-custody in order of suspected highest to lowest impact, as evidenced by the recorded PID readings. Indicate on the chain-of-custody for the laboratory to analyze the canisters in order from the lowest to highest PID reading.

7.1 SAMPLING DOCUMENTATION

Details of each sub-slab soil vapor probe sampling should be recorded within a standard CRA field book and on Form 2 –Air Sampling Field Data Sheet. Details should include:

☐Purge data (purging rate, duration of purging, purged volume)

☐Helium leak test time and result (i.e., helium concentration in ppm and pass or fail determination)

☐Field measurement of total VOCs

☐Field measurements of oxygen, carbon dioxide, methane, and total VOCs

☐ Summa™ canister, flow controller and pressure gauge IDs

☐Sample start time and initial Summa™ canister pressure

☐Sample end time and final Summa™ canister pressure

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USEPA, 2006. Assessment of Vapor Intrusion in Homes Near the Raymark Superfund Site Using Basement and Sub-Slab Air Samples, March 2006. EPA/600/R-05/147.

USEPA, 2010. Vapor Intrusion Guidebook, October 2010.

APPENDIX B-2
STANDARD OPERATING PROCEDURE
FOR COLLECTING INDOOR, OUTDOOR, AND CRAWL SPACE AIR SAMPLES

TABLE OF CONTENTS

LIST OF FORMS
(Following Text)

1.0 PLANNING AND PREPARATION

Prior to collecting air samples:

1. Review the Work Plan and Health and Safety Plan (HASP) with the Project Coordinator.
2. Assemble all required equipment, materials, log books, and forms.
3. Obtain information on the samples to be collected to ensure a complete understanding of the task to be performed.
4. Determine the type of analyses that are required for the samples.
5. Arrange access to the site, especially if the property owner is not our client. Obtain all necessary keys. Also consider site conditions (e.g., is snow removal required?).
6. Review the Building Physical Survey Questionnaire for the building/property and determine if conditions have changed and if the form needs to be updated.
7. Provide the building occupant with the list of instructions to follow while the Summa™ canister sample is being taken in the building. The instructions are listed in the attached Form 3 - Indoor Air Sampling Instructions to Building Occupants. The date and completion time of the 8- or 24-hour sample period (for commercial/industrial or residential buildings, respectively) will be written on Form 3, and the occupant will be informed that the sampling team will be back to pick up the canister after approximately 8 or 24 hours.

2.0 INDOOR, OUTDOOR, AND CRAWL SPACE AIR SAMPLE COLLECTION PROCEDURE

Indoor air samples will be collected from the buildings that are or may be occupied but have no slab (e.g., they have a dirt or gravel floor) and residential buildings with basements. The indoor air samples will be collected from the lowest floor of the building. An outdoor air sample will be collected concurrently with the indoor air sample from an upwind location on the building property, in accordance with Ohio EPA vapor intrusion guidance (Ohio EPA, May 2010). Crawl space air samples will be collected from buildings with crawl spaces between the bottom floor and the building slab or ground surface (e.g., trailers with skirts).

The indoor, outdoor, and crawl space air samples will be collected using a Summa™ canister (6-liter capacity) equipped with a flow regulation device set to allow the collection of an air sample over an 8-hour or 24-hour sampling period, for commercial/industrial or residential buildings, respectively. The flow regulation device will be supplied and calibrated by the laboratory selected to conduct the sample analysis. Air samples will be collected using individually certified clean Summa™ canisters. The canisters will be pre-cleaned at the laboratory in accordance with USEPA's TO-15 method and documentation of the cleaning activities will be provided by the laboratory.

To the extent possible, the indoor air samples will be collected with windows and doors closed to represent appropriately conservative conditions during sampling. If possible, windows and doors should be kept closed for a period of at least 24 hours prior to sample collection. During summer months, air conditioners typically would be operating under closed windows/doors conditions, and the operation of an air conditioner can be allowed during sample collection. This would be representative of season-specific ventilation conditions, and with the expected pattern of operation of the building. Care will be taken to deploy the Summa™ canisters away from the direct influence of any forced air emanating from an air conditioning unit or central air conditioning vents.

The indoor air sampling procedure is described as follows:

☐ Before indoor air sampling begins, information related to occupant lifestyle choices that could potentially influence indoor air quality will be documented on the attached Form 1 – Building Physical Survey Questionnaire. Such information includes the use of cleaning products, dry-cleaner use, indoor storage of paints and/or petroleum hydrocarbon products, use of aerosol consumer products, smoking, etc.

☐ Samples will be collected as close as practical to the center of the building footprint, but away from high traffic areas to minimize the potential for disturbances during sample collection. Typically, the intake point of the sample canisters will be located at breathing zone height; approximately between 3 to 5 feet (1 to 1.5 meters) above floor level.

The outdoor air sampling procedure is described as follows:

☐ For each outdoor air sample, a suitable upwind location (selected to minimize the potential for disturbances during sample collection) will be selected. The outdoor air sample will be collected a minimum of 3 feet (1 meter) above grade (if possible), at least 3 to 6.5 feet (1 to 2 meters) away from the structure, and located to minimize the potential for disturbance of the canister.

☐ Precautions will be taken to ensure the canister inlet is protected from precipitation. Either place the canister under a shelter/enclosure, use a sampling cane provided by the laboratory, or use a clean piece of aluminum foil to build a tent over the flow controller inlet.

The crawl space air sampling procedure is described as follows:

☐ Crawl space air samples will be collected as close as practical to the center of the building footprint. If the canister cannot be placed at this location, the sample inlet will be extended with a piece of Teflon® tubing. The tubing can be directed to the desired location with a metal wire or rod. The tubing inlet must be at least several inches above the ground or slab surface.

General air sampling procedures:

☐ Air sample canisters will be labeled with a unique sample designation number. Both the sample number and the sample location information will be recorded on the attached Form 2 –Air Sampling Field Data Sheet. The sample unique designation numbers will have the following format:

MC-38443-MMDDYY-XX-NNN

Where:
MC (Matrix Code) - Designates type of sample (IA – indoor air; OA – ambient air; CS – crawl space air)
38443 - Project reference number
MMDDYY - Designates date of collection presented as month, day, and year
XX - Sampler's first and last initials
NNN - Sequential sample number for event starting with 001

☐ The Summa™ canister vacuum will be measured immediately prior to canister deployment and recorded on Form 2 –Air Sampling Field Data Sheet.

☐ The flow controller will be installed, as supplied by the laboratory, on the canister and the canister will be opened fully at the beginning of sample collection period and start time recorded on Form 2 –Air Sampling Field Data Sheet.

☐ At the start and the end of the 8- or 24-hour sample period (for commercial/industrial or residential buildings, respectively), a portable photoionization detector (PID) will be used to screen for total VOC presence in the sample area. Results of the PID monitoring were recorded on Form 2 –Air Sampling Field Data Sheet.

☐ The canister pressures will be checked periodically during the sample collection period to ensure they are collecting at the desired flow rate. At a minimum the canisters will be checked several hours prior to the expected end time so that the final canister pressure does not reach zero.

☐ Some residual vacuum should be left in each canister following sample collection. A maximum residual vacuum of 10 inches Hg is allowed. A canister residual vacuum above this value will require continued sampling until vacuum reading is below this threshold, unless the vacuum remains above 10 inches Hg for more than 30 minutes. A minimum 1-inch Hg residual vacuum will be required for the sample to be considered valid, or the sampling will be repeated using a fresh Summa™ canister.

☐The canister valve will be closed fully at the end of the sample period, and the safety cap will be secured on the canister. Record the final canister pressure and end time on the field data sheet. If there is evidence of canister disturbance during the sample collection, this will also be recorded.

2.1 SAMPLING DOCUMENTATION

Details of the air sampling should be recorded within a standard CRA field book and on Form 2 –Air Sampling Field Data Sheet. Details should include:

☐ Summa™ canister, flow controller and pressure gauge IDs

☐Sample start time and initial Summa™ canister pressure

☐Outside temperature and barometric pressure at sample start and finish

☐Inside temperature at sample start and finish

☐PID readings within the building

☐Sample end time and final Summa™ canister pressure

4.0 REFERENCES

Cal EPA, 2005. Interim Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion in Indoor Air. Department of Toxic Substances Control, (revised February 7).

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USEPA, 2006. Assessment of Vapor Intrusion in Homes Near the Raymark Superfund Site Using Basement and Sub-Slab Air Samples, March 2006. EPA/600/R-05/147.

USEPA, 2010. Region 5 - Vapor Intrusion Guidebook, United States Environmental Protection Agency.

APPENDIX C

ADDENDA TO EXISTING PROJECT FIELD SAMPLING PLAN AND
QUALITY ASSURANCE PROJECT PLAN

APPENDIX C-1

ADDENDUM TO EXISTING PROJECT FIELD SAMPLING PLAN

The purpose of the Field Sampling Plan (FSP) is to detail the sampling and data gathering activities to be used at the Site and to outline the procedures to be used to complete the field activities at the Site. All Site field activities will be completed in accordance with USEPA-approved Work Plans, the FSP (CRA, October 2008), the Quality Assurance Project Plan (QAPP, CRA, May 2008) and Health and Safety Plan (HASP, CRA, May 2008), and any USEPA-approved addenda to the FSP, QAPP, and HASP.

The investigative tasks to be completed are discussed in detail in the individual Work Plans.

Sub-slab soil vapor and indoor air sampling activities, including crawl space sampling, will be completed in accordance with the USEPA-approved Work Plans and CRA's SOP for sub-slab soil vapor sampling and indoor air sampling as presented in the addenda to the FSP (i.e., Appendix B of the Vapor Intrusion Work Plan).

APPENDIX C-2

ADDENDUM TO THE EXISTING PROJECT QUALITY ASSURANCE PROJECT PLAN

K.1.0 INTRODUCTION

United States Environmental Protection Agency (USEPA) policy requires that all work performed by or on behalf of USEPA involving the collection of environmental data be implemented in accordance with a USEPA-approved Quality Assurance Project Plan (QAPP). The QAPP is a planning document that provides a "blueprint" for obtaining the type and quantity of data needed to support the intended use(s) of the data. The QAPP integrates all technical and quality aspects of a project and documents all quality assurance (QA), quality control (QC), and technical activities and procedures associated with planning, implementing, and assessing environmental data collection operations.

This QAPP has been prepared by Conestoga-Rovers & Associates (CRA) in accordance with the Region 5 Instructions on the Preparation of a Superfund Division Quality Assurance Project Plan Based on EPA QA/R-5 (Revision 0, June 2000); EPA Requirements for Quality Assurance Project Plans (QA/R-5) (EPA/240/B-01/003, March 2001); and EPA Guidance for Quality Assurance Project Plans (QA/G-5) (EPA/600/R-98/018, February 1998). In accordance with these documents, there are four basic groups of elements that must be included in a QAPP. These four groups, the associated elements, and QAPP Sections follow:

- Group A - Project Management, Sections K.2.0 and K.3.0. The elements in this group include all aspects of project management, project objectives, and project history.
- Group B – Data Generation and Acquisition, Sections K.4.0 and K.5.0. The elements in this group include descriptions of the design and implementation of all measurement systems that will be used during the project.
- Group C – Assessment/Oversight, Section K.6.0. The elements in this group encompass the procedures used to ensure proper implementation of the QAPP.
- Group D – Data Validation and Usability, Section K.7.0. The elements in this group cover the QA activities that occur after the data collection phase of the project is completed.

The elements that comprise project management, data generation and acquisition, assessment/oversight, and data validation and usability for the groundwater, soil, surface water, sediment, soil vapor, sub-slab soil vapor, and indoor air investigation activities to be conducted during the investigative activities as described in the

USEPA-approved Work Plans and the Field Sampling Plan (FSP) for the South Dayton Dump and Landfill Site located in Moraine, Ohio (Site) are documented in this QAPP.

It is the intent of the investigative activities to collect additional data to help address data gaps at the Site and aid in the completion of a Feasibility Study (FS).

The FS will include the development and evaluation of alternatives for remedial action that will meet the remedial action objectives for the Site and protect human health and the environment by eliminating, reducing or controlling risks posed through each pathway at the Site. The primary focus of this QAPP is the investigative activities in the Work Plans and the FSP.

APPENDIX D

TRICHLOROETHENE UPDATED REGIONAL SCREENING LEVEL CALCULATION SHEETS

Appendix D.1
Calculation of Residential Indoor Air Screening Level for Trichloroethene
Vapor Intrusion Investigation Work Plan
South Dayton Dump and Landfill Site, Moraine, Ohio

Equation			
Residential Indoor Air Screening Level			
$SL_{res\text{-}nc\text{-}inh}$	$(THQ \times AT_r\ [365 \times ED_r] \times 1000)\ /\ ([1/RfC] \times EF_r \times ED_r \times ET_r \times [1/24])$		
$SL_{res\text{-}ca\text{-}inh}$	$(TR \times AT_r\ [365 \times LT])\ /\ (EF_r \times ET_r \times [1/24] \times ED \times IUR)$		
$SL_{res\text{-}mut\text{-}inh}$	$(TR \times AT_r\ [365 \times LT])\ /\ [(EF_r \times ET_r \times [1/24] \times ED_{0-2} \times IUR_K \times ADAF_{0-2}) + (EF_r \times ET_r \times [1/24] \times ED_{0-2} \times IUR_{L+NHL})$ $+ (EF_r \times ET_r \times [1/24] \times (ED_{2-6} \times IUR_K \times ADAF_{2-6}) + (EF_r \times ET_r \times [1/24] \times (ED_{2-6} \times IUR_{L+NHL})$ $+ (EF_r \times ET_r \times [1/24] \times (ED_{6-16} \times IUR_K \times ADAF_{6-16}) + (EF_r \times ET_r \times [1/24] \times (ED_{6-16} \times IUR_{L+NHL})$ $+ (EF_r \times ET_r \times [1/24] \times (ED_{16-30} \times IUR_K \times ADAF_{16-30}) + (EF_r \times ET_r \times [1/24] \times (ED_{16-30} \times IUR_{L+NHL})]$		

Symbol	Definitions (units)	Value	Reference
SLs			
$SL_{res\text{-}nc\text{-}inh}$	Residential Indoor Air Noncarcinogenic Inhalation (ug/m^3)	2.1E+00	Calculated
$SL_{res\text{-}ca\text{-}inh}$	Residential Indoor Air Carcinogenic Inhalation (ug/m^3)	5.9E-01	Calculated
$SL_{res\text{-}mut\text{-}inh}$	Residential Indoor Air Mutagenic Inhalation (ug/m^3)	4.3E-01	Calculated
Toxicity Values			
RfC	Chronic Inhalation Reference Concentration (mg/m^3)	2.0E-03	EPA 2011b
IUR	Kidney, NHL, Liver unadjusted Inhalation Unit Risk $(ug/m^3)^{-1}$	4.1E-06	EPA 2011b
IUR_K	Kidney unadjusted Inhalation Unit Risk $(ug/m^3)^{-1}$	1.0E-06	EPA 2011b
IUR_{L+NHL}	Liver, NHL unadjusted Inhalation Unit Risk $(ug/m^3)^{-1}$	3.1E-06	EPA 2011b
Miscellaneous Variables			
THQ	Target Hazard Quotient	1.0	--
TR	Target Risk	1.00E-06	--
AT_r	Averaging Time - Resident (days)	Calculated (1)	EPA 1989
Exposure Frequency, Exposure Duration Variables			
EF_r	Resident Exposure Frequency (days/yr)	350	EPA 2011a
ED_r	Resident Exposure Duration (yr)	30	EPA 2011a
ED_{0-2}	Exposure Duration - Age Segment 0-2 (yr)	2	EPA 2011a
ED_{2-6}	Exposure Duration - Age Segment 2-6 (yr)	4	EPA 2011a
ED_{6-16}	Exposure Duration - Age Segment 6-16 (yr)	10	EPA 2011a
ED_{16-30}	Exposure Duration - Age Segment 16-30 (yr)	14	EPA 2011a
ET_r	Resident Exposure Time (hr/day)	24	EPA 2011a
LT	Lifetime (yr)	70	EPA 2011a
Miscellaneous Variables			
Kidney $ADAF_{0-2}$	Age Dependent Exposure Factor - (0-2 yr) (unitless)	10	EPA 2005
Kidney $ADAF_{2-6}$	Age Dependent Exposure Factor - (2-6 yr) (unitless)	3	EPA 2005
Kidney $ADAF_{6-16}$	Age Dependent Exposure Factor - (6-16 yr) (unitless)	3	EPA 2005
Kidney $ADAF_{16-30}$	Age Dependent Exposure Factor - (16-30 yr) (unitless)	1	EPA 2005

Notes:

(1) Calculated as the product of ED (years) x 365 days/year for noncarcinogenic exposures and as the product of 70 years assumed human lifetime x 365 days/year for carcinogenic exposures (EPA, 1989).

IRIS = Integrated Risk Information System

NHL = Non-Hodgkins Lymphoma

Equations used to calculate the non-cancer and non-mutagenic cancer screening level were obtained from the EPA's *Regional Screening Levels for Chemical Contaminants at Superfund Sites* User's Guide (EPA, 2011a).

References:

EPA, 1989: *Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A.* OERR.

EPA, 2005: *Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens* . Risk Assessment Forum. EPA/630/R 03/003F. March.

EPA, 2011a: *Regional Screening Levels for Chemical Contaminants at Superfund Sites* User's Guide. June.

EPA, 2011b: Integrated Risk Information System (IRIS) Database. http://www.epa.gov/iris/index.html.

Appendix D.2
Calculation of Industrial Indoor Air Screening Level for Trichloroethene
Vapor Intrusion Investigation Work Plan
South Dayton Dump and Landfill Site, Moraine, Ohio

Equations			
Industrial Indoor Air Screening Level			
$SL_{Ind\text{-}nc\text{-}inh}$	$(THQ \times AT_w\,[365 \times ED_w] \times 1000) / ([1/RfC] \times EF_w \times ED_w \times ET_w \times [1/24])$		
$SL_{Ind\text{-}ca\text{-}inh}$	$(TR \times AT_w\,[365 \times LT]) / (EF_w \times ET_w \times [1/24] \times ED_w \times IUR)$		

Symbol	Definitions (units)	Value	Reference
SLs			
$SL_{Ind\text{-}nc\text{-}inh}$	Industrial Indoor Air Noncarcinogenic Inhalation (ug/m^3)	8.8E+00	Calculated
$SL_{Ind\text{-}ca\text{-}inh}$	Industrial Indoor Air Carcinogenic Inhalation (ug/m^3)	3.0E+00	Calculated
Toxicity Values			
RfC	Chronic Inhalation Reference Concentration (mg/m^3)	2.0E-03	EPA 2011b
IUR	Inhalation Unit Risk $(ug/m^3)^{-1}$	4.1E-06	EPA 2011b
Miscellaneous Variables			
THQ	Target Hazard Quotient	1.0	--
TR	Target Risk	1E-06	--
AT_w	Averaging Time - Worker (days)	Calculated (1)	EPA 1989
Exposure Frequency, Exposure Duration Variables			
EF_w	Worker Exposure Frequency (days/yr)	250	EPA 2011a
ED_w	Worker Exposure Duration (yr)	25	EPA 2011a
ET_w	Worker Exposure Time (hr/day)	8	EPA 2011a
LT	Lifetime (yr)	70	EPA 2011a

Notes:

(1) Calculated as the product of ED (years) x 365 days/year for noncarcinogenic exposures and as the product of 70 years assumed human lifetime x 365 days/year for carcinogenic exposures (EPA, 1989).

IRIS = Integrated Risk Information System

Equations used to calculate the screening level were obtained from the EPA's *Regional Screening Levels for Chemical Contaminants at Superfund Sites* User's Guide (EPA, 2011a).

References:

EPA, 1989: *Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A.* OERR. EPA/540/1-89/002.

EPA, 2011a: *Regional Screening Levels for Chemical Contaminants at Superfund Sites* User's Guide. June.

EPA, 2011b: Integrated Risk Information System (IRIS) Database. http://www.epa.gov/iris/index.html.